# LANDFILL WASTE AT HUMBOLDT STATE UNIVERSITY AND BEYOND

By

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ABSTRACT

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In this thesis, I explore how landfill waste is a social and environmental problem, with cultural and political roots. I explore national and global issues of consumption and waste production using the framework of neoliberalism and ecological crisis (Chew 2002). I then analyze the landfill-bound waste of Humboldt State University in three phases: a waste audit, a student survey, and a study of best practices for signage. In my study, I found significant amounts of potentially divertible (compostable and recyclable) waste in landfill trash, and uncovered several barriers to recycling and composting. I provide recommendations to address the problems of compostable and recyclable waste being found in the landfill-bound waste stream at Humboldt State University, and provide both a literature review and examples of potential signage for future use by to the Sustainability Office and campus Dining Services. In my discussion, I explore what the individual can do in their daily life to ameliorate the problems of global massive waste creation and unsustainable waste disposal practices.

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# CHAPTER ONE: THE PROBLEM WITH LANDFILLS

In 2012, Americans generated about 251 million tons of individual household and commercial trash, averaging 4.6 pounds per day per person (E.P.A. 2012). To illustrate this, a Boeing 747 Jumbo Jet weighs 1 million tons; therefore, 251 million tons would roughly be the equivalent of 251 Boeing 747s (Ocean Conservancy Blog 2013). Fifty-five percent of this amount ends up in landfills, buried under the ground (Kulpinski n.d.). Nationally, there are 1,754 landfills and 87 incinerators, which is where the majority of our society's trash ends up, buried or burned, respectively (E.P.A. 2006). Average landfill capacity is 2.5 million metric tons each (Bagchi and Bhattacharya 2015). The environmental impacts of landfills, incinerators, and daily trash creation are well-documented and vast (Ford et. al. 2011; El-Fadel, Angelos and Leckie 1997; Kalcikova, Vavrova, Zagorc-Koncan and Zgajnar 2011).

However, the story of our trash is more complicated than it may appear at surface level. Aside from the environmental effects of waste, the politics of waste management have manifested along historically repeating paths of inequality, and is one of the many facets of the current capitalist and consumerist economic model that neoliberal policies support and American culture embraces, reproducing various forms of social inequalities.

In this paper I examine the environmental, socio-political issues associated with landfills and then describe the current project, a case study of waste at Humboldt State University, a small public university in a rural area along coastal Northern California. In

this chapter, and in Chapter Two, I explore the social and economic origins of how trash has become such a problem, and examine some of the political roots of the issue.

To explore the issues of landfills more locally, I conducted a three-part study of waste at Humboldt State University. In Chapters Three to Five, I explore each phase of the study, explaining my methods and findings for a waste audit, a survey of student knowledge and behaviors around recycling and composting, and a best practice study of signage, to promote recycling and composting. Finally, in Chapter Six I include a discussion and conclusion section, looking at the limitations of this study. I also provide next steps for future research, including an exploration of other important types of waste not included in this study, such as electronic waste (e-waste), I begin this exploration by explaining various problems with trash, and the landfills and incinerators used to handle trash, for the rest of this chapter.

*The Problems with Trash*

Landfill sites, also commonly referred to as dumps or garbage dumps, are sites for waste disposal via burial in the ground. It is one of the oldest forms of waste disposal and is used worldwide (Powell, Townsend and Zimmerman 2016). Landfill waste does not break down as readily as organic compostable matter does, due to the lack of oxygen in landfills, and the inorganic composition of landfill trash. As such, most landfill waste will remain buried intact for centuries; for instance, plastic bags can take over 500 to decompose, if they ever do (U.S. National Park Service n.d.; U.S. Composting Council n.d.).

Incineration uses combustion via high temperatures to burn waste materials to ash, reducing the overall volume of trash that must be buried in landfills. It is particularly used for certain types of hazardous waste (LeBlanc 2016). Ten to fifteen percent of the municipal waste in the United States annually is burned in incinerators (Denison 1996).

Despite increases in recycling and composting trends nationally, the majority of U.S. municipal waste—the trash everyday people create and throw away—end up in landfills or incinerators (EPA 2004). The problems with landfills and incinerators can be divided into three broad categories: environmental, socio-political, and economic.

*Environmental Problems with Landfills & Incinerators*

One of the key problems associated with landfills and incinerators is that they have numerous damaging environmental effects. First, leachate—toxic liquid waste run-off found create in landfills—can contaminate the surrounding earth and the ground water (Ford et. al. 2011; El-Fadel, Angelos, Leckie, 1997; Kjeldsen, Peter et al. 2002). Even biologically treated and filtered leachate has been found to be an environmental risk (Kalcikova, Vavrova, Zagorc-Koncan, Zgajnar 2011). A 2011 study of 19 landfills across the United States found 129 Contaminants of Emerging Concern (CECs) in landfill leachate. These contaminants included 62 prescription pharmaceuticals, 23 industrial chemicals, 18 nonprescription pharmaceuticals, 16 household chemicals, six steroid hormones, and four plant/animal sterols (Masoner et. al. 2014).

Second, landfills release methane gas (CH4) (E.P.A. 2013; El-Fadel, Angelos, Leckie, 1997) due to the anaerobic decomposition of waste material in the landfill

environment (Wang et. al. 2015). Anaerobic conditions occur in landfills due to the oxygen-starved nature of the environment from the practice of capping the landfill with an impervious layer such as concrete. The more organic materials in a landfill (biodegradable materials that break down such as food waste, paper, and some textiles), the more anaerobic decomposition that occurs; the more anaerobic decomposition, the more methane gas that is released as a result (U.S. Composting Council n.d.). Annually, 2.6 millions tons of methane gas are collected from landfills, most used to generate heat and electricity. However, this 2.6 millions tons is less than 10% of the total CH4 gas emissions that are released by landfills annually, making landfills the third largest source of methane emissions following industry and agriculture in this country (Themelis, Ulloa 2007; E.P.A. 2013). Open landfills release 91% of all landfill methane emissions; closed landfills were found by some researchers to have reduced methane emissions and more efficient methane gas collection. However, all landfills release significant amounts of toxic fumes, whether open or closed (Powell, Townsend, Zimmerman 2016). Methane, when released to the atmosphere, contributes to global climate change (Huber-Humer, Gerbert, Huger 2008; El-Fadel, Angelos, Leckie, 1997), which some theorize to be the most serious environmental threat currently, on par in terms of destructive potential as both World Wars and the Great Depression combined (Dauvergne 2008) and which may be a warning of impending ecological system collapse (Chew 2008). Furthermore, the air pollution from landfills and from burning waste in incinerators creates unhealthy air for local residents as well as a stench that becomes a permanent negative environmental factor for these communities (Adzimah and Anthony 2009).

The carbon dioxide (CO2) emissions from trucking all of our waste is a third issue, especially since landfills and incinerators are often located a far distance from the source of the waste. The national Solid Waste Management Association reports that 148,000 vehicles are used to move garbage, employing 368,000 people (Kulpinski n.d.). For instance, in Humboldt County (where this current study takes place) the majority of trash is processed by the Humboldt Waste Management Authority (HWMA) and is sent in 23 ton shipments north 193 miles to Medford, OR, 161 miles east to Anderson, CA, or 278 miles south to Suisun City, CA, where the waste is buried in landfills (Scott-Goforth 2015). There is a sizeable carbon footprint associated with trucking the waste to its final destination: 12,729,184 pounds of CO2 are produced annually hauling Humboldt County's trash over a total of 1,137,550 total round trip miles, consuming an estimated 189,590 gallons of diesel fuel. As a comparison, the annual CO2 emissions per typical U.S. household are 14,920 (Scott-Goforth 2015). Humboldt County is one small, rural county; the national impacts of shipping trash have not yet fully been explored.

Fourth, another environmental hazard that is created by landfills and waste processing facilities is rodents and insects, such as cockroaches and rats, which can be vectors for disease (Scott-Goforth 2015).

Incinerators, like landfills, emit pollution into the environment. Harmful emissions especially come from burning heavy metals such as those contained in batteries and some household items. Most serious pollution concerns are regarding the emission of furans and dioxins, which are extremely carcinogenic (Walsh, Warland and Smith 2010). In addition to the pollution released by burning trash, the ash that remains is highly toxic

and can contaminate ground water and air which may lead to direct or indirection human or animal consumption such as through drinking the water, dermal exposure, or via food crops (Walsh, Warland and Smith 2010). Approximately 47 percent of incinerator ash is buried in landfills while 53 percent is sent to specially designed monofills (Walsh, Warland and Smith 2010).

*Socio-political Problems with Landfills and Incinerators*

Another issue with landfills and incinerators revolves around the politics of waste management. Those who are the most disadvantaged in the United States—specifically, economically disadvantaged African American, Latino, and Native American communities—end up bearing the brunt of the environmental impacts from landfills and other toxic facilities (Taylor 2014; Smith 2005) as well as environmental degradation in general (Feagin 2001). For instance, Robert Bullard's landmark 1983 study revealed that four out of five of the city of Houston's trash incinerators were located in predominately Black neighborhoods, while the fifth one was located in a predominately Hispanic neighborhood. Similarly and more recently, a Philadelphia-based study found that the 39 communities most burdened by environmental risks such as incinerators, factories, and sewage treatment centers, were the most economically vulnerable communities in the Metropolitan Statistical Area (Diane 2010). Likewise it is interesting to note that where the current study takes place in Arcata, CA, the demographics are largely White and the trash produced here is trucked to a landfill in Suisan City, where over half (nearly 60 percent) of the population self identifies as minorities (specifically, Black, Hispanic,

Asian, and Pacific Islander) (U.S. Census 2010). Note that landfills are found in predominately White areas as well, such as the landfill in Medford, CA where Arcata's trash is also trucked to, however it is located in an economically depressed area (U.S. Census 2010).

Landfills, incinerators, and chemical factories may be located in low income and African American communities because the backlash against the companies that own these landfills and plants is assumed to be minimal. There may also be the assumption by the companies that own these facilities that the local residents will welcome the jobs that may accompany the facilities. Often, these promised jobs never actually manifest (Taylor 2014). This phenomenon is called *disproportionate siting* (Taylor 2014). Due to disproportionate siting most landfills, incinerators, and other toxic factories are located in communities that are approximately 80% people of color (Mohanty 2003). As these communities often do not have other choices it seems they are backed into a corner, coerced to accept these dangerous landfills and factories by lack of other viable, and healthier, options. For example, Michigan has begun to accept all garbage from Ontario, Canada, to process and store at the Pine Tree Acres Landfill. Michigan is the state with the second-highest rate of unemployment and the residents there seemed to welcome the garbage industry as a potential job producer (Belanger 2007). As Smith (2005) explains, "It is noteworthy that the people who are targeted as expendable…are people of color or Global South people who have the least institutional power or access to resources in society" (p. 63). Mining, nuclear testing, nuclear waste storage, toxic chemical facilities,

and landfills are some of the environmental exploits that are often located on or near U.S. Native reservations (Smith 2005).

The health consequences on communities of color have also been well documented. Proximity to the mining and toxic hazards discussed in Smith's (2005) study has been associated with residents experiencing various illnesses including cancers, hepatitis B, reproductive problems, birth defects, endometriosis, lupus, and learning disabilities (Smith 2005). Other studies of areas near polluting facilities and environmental hazards, inhabited mostly by racial minorities, have found higher rates of cancer, chronic respiratory illness, neurological disorders, infant mortality rates, eye irritations, nausea, stomach problems, body aches and cramps (Rainey and Jones 2005). As an example, the Holt family, and surrounding community of Dickson County, Tennessee, suffered negative health impacts after the polluting of their private well by the leaky Dickenson County landfill nearby. The Scovill-Shrader Automotive manufacturing plant had buried drums of industrial waste solvents at the landfill and therefore the water was contaminated by trichloroethylene (TCE), a known carcinogen. While the government knew of the contamination, the family was not informed, and drank the contaminated water from the well for 12 years (Johnson, Glenn, Rainey, Johnson 2008, Gordy 2007). According to the Agency for Toxic Substances and Disease Registry website, drinking TCE causes symptoms that range from nausea to liver and kidney damage, impaired immune system, impaired heart function and cancer. Deaths and birth defects of the family's farm animals were another result of the contaminated water.

In conclusion, it is people of color and persons of low-socioeconomic status who remain disproportionately impacted by their close proximity to toxic facilities (Johnson, Glenn, Rainey, Johnson 2008), resulting in serious health ailments and effects. Currently and historically, this is one of the major problems with trash.

*Fiscal Problems with Landfills*

In addition to the environmental and social problems associated with landfills and waste management, there is an enormous fiscal cost to operating, managing, and monitoring landfills. Again, using Humboldt County where the current study takes place as a case study, the Cummings Road Landfill has been open since the 1930s. It was recently closed by the Humboldt Waste Management Authority in 2015 (Faulkner 2015). Phase one of the closure plan cost $4.4 million dollars, and phase two is estimated to cost $2.3 million. Further, the HWMA is obligated to monitor the site for the next 30 years at a cost of $400,000 dollars annually. The cost to haul and dispose of the leachate (the toxic landfill liquid described above) is $120,000 a year, and this creates uncalculated amounts of CO2 from the trucks hauling the leachate away. In the United States, landfills are only required to be monitored for a set number of years, usually 30. While the landfill waste remains in the earth indefinitely, yet there is no environmental overseeing after the set 30 years. Canadian landfills, by comparison, are required to be monitored forever (Belanger 2007).

The literature review reveals several major problems with trash to be considered: environmental, socio-political, and fiscal. In the next chapter I will look more closely at

some of the cultural and political reasons we have so much waste to dispose, and what the bigger ecological implications may be. Then, in subsequent chapters, I will describe my current project which examines landfill-bound waste at Humboldt State University

# CHAPTER TWO: GOING DEEPER INTO THE ROOTS OF OUR TRASH

Why is there so much waste to be dealt with? Because we (humans) are creating that much waste. The core question is therefore: Why are we creating so much waste? Here I will examine the cultural and political roots of our trash phenomena.

## *The Role of Mass Consumerism*

Everything must go somewhere. This is a basic law of physics, as matter is indestructible. “When we discard things, they don’t just ‘go away’,” states Bill Devall 1993), in his book *Living Richly in an Age of Limits*. Because the average individual does not see where their trash ends up after it is disposed of, there is a disconnect between the waste we create and the accumulative consequences of that waste. Despite this disconnect, waste must end up somewhere, it does not just disappear. Because U.S. capitalism is driven by mass consumerism, massive waste results, and therefore there is a lot of waste that is not just disappearing but is ending up somewhere.

Mass consumerism began with the capitalist development of Fordism. This was an era of accumulation, relying on the people consuming more and more material objects, along with a transformational view of workers and consumers (Ivanova 2011). After World War II, consumerism, fueled by the appeal of “The American Dream,” began to rise exponentially. Newfound and powerful commercial propaganda also emerged around this time, such as the work of Pierre Martineau, marketing guru, who used social class-based differences in preferences to solidify social class stratification (Ivanova 2011). In other words, using marketing ploys to sell certain products to certain groups of people,

and to sell different products to other groups of people. “Buying things therefore became) the fetish form in which the exploitative class relation between labor and capital is hidden” (Ivanova 2011:8). Social theorist Bourdieu has stated that social “tastes” and preferences are not innate human traits but rather are socially constructed and conditioned, enforced by dominant elites maintaining hierarchical social order to serve their purposes of supremacy and authority (Allen and Anderson 1994).

Some theorize that “The American Dream” is in fact a hegemonic project, promoting accumulation of material things as a path to life satisfaction and contentment, as well as a sign of civic duty and accomplishment, while in fact serving neoliberal profiteering agendas (Ivanova 2011). Dubbed as the *Age of Exuberance* (Devall 1993) the period of time from the post World War II years up into the early 1990s saw the wealthiest nations—the United States and Canada—go on a forty year spending binge, not considering the economic or ecological consequences. Many individuals in the U.S. during this time, and up to the present, became focused on consumption of material things.

Currently, people in the United States buy more and more of everything—houses, automobiles, appliances, and so on (Devall 1993). This period of time can be viewed as the apex of consumptive culture, the feverish crescendo before the environmental consequences became too obvious to ignore any longer. The devastating irony is that what we have called a “higher” standard of living has threatened not only the quality of human lives, but the viability on planet Earth as we know it (Devall 1993).

According to Devall, the *Age of Exuberance* lasted for four during the mid-twentieth century and then gave way to *the Age of Denial*, which continues up into the present moment (2015). Essentially, from the 1970s up to this current point in time, capitalism has imposed huge environmental costs, such as increased fossil fuel use, widespread deforestation, and industrial pollution, all which contribute to global warming and climate change (Feagin 2001). Landfill waste is one small symptom of the bigger systemic environmental issues. We are just now beginning to experience, as a collective culture, a shift as people are becoming more and more open to examining the ecological effects of the mass consumptive and waste-producing lifestyles and behaviors.

The problem with waste creation and waste management does not stop at national borders. Brooklyn artist and Brazilian native, Vik Muniz, spent three years in this landfill filming a documentary of his journey to create art with and through the catadors, or, recyclable pickers who daily sort through the giant heaps of trash in search of plastics and other recyclable material. He specifically studied the world's largest landfill, Jardim Gramacho, near Rio de Janeiro, Brazil. His film *Waste Land* (2010) reveals the class and race politics operating in this massive landfill. Echoing the previous examples from Taylor and Mohanty (2014; 2003) where primarily Black and Hispanic communities of low socio-economic means are targeted for placement of landfills and other toxic facilities, we see primarily only Black and indigenous individuals working as recyclable pickers at Jardim Gramacho, all of whom are there due to extreme poverty and lack of other options (except prostitution or drugs). The poorest in society get relegated the job

of dealing with the rest of society's trash, similar to the most marginalized communities absorbing the brunt of the ecological damage of landfills, as explored above.

*The Real Story of Trash*

Waste is more then personal refuse; it is a tangible symbol of a culture's way of life. It is important to recognize that the story of our trash is not only one of social inequalities and oppression, but also one of extreme profligacy; indeed, one may not be able to operate without the other. People in the United States make up five percent of the world's population, but consume 30 percent of the resources (Leonard 2010). According to the Bureau of Labor Statistics, Americans spend three- to four-fold more of their time consuming than Europeans, and the more people buy, the more they ultimately throw away (Dymond 2012). In fact, 3.5 planets would be needed if everyone consumed like the United States (McLellan 2014).

The story of our trash is a political story of production and consumption within an emerging globalized system (Dauvergne 2008). Consumption cannot occur without production, the two are intertwined. Production creates the goods felt by the consumer as necessary to consume; the flip side is that consumption catalyzes more and more production (Marx 1939). This is an old story of exploitation (classical Marxism- the elite strata (the bourgeoisie) exploit the working class (the proletariat) by undervaluing their labor and preventing their ownership of the means of production) manifested in new ways, through globalized neoliberal transnational free trade policies, resulting in the exportation of exploitation (Marx 1939). Currently, a plethora of cheaply made goods are

produced in primarily U.S. owned factories in “Third World” countries, where mostly poor peasant women are employed in terrible conditions. These conditions include unsanitary working conditions, forced and sometimes unpaid overtime, degrading treatment, very poor wages (sometimes as little as 12 cents per hour) and lack of employment rights (Meyers 2004; Featherstone 2007). Because the exploited factory workers often have no other current viable options, they may seem to welcome the jobs these industries create as opportunities, exploited via *wrongful beneficence* (Meyers 2004). This parallels the seeming welcome of landfills and toxic facilities by poor minority communities in the U.S. discussed earlier in chapter one.

Following the path of waste, these “goods” that are made in foreign factories are then shipped to “First World” countries and usually sold at an exorbitant price mark up. Ultimately, the products and the packaging used to ship them, will end up in landfills or incinerators, either in the countries where these good were consumed, or shipped to another “Third World” country to be dealt with there, through landfill burial or- depending on what type of trash- for sorting by local people to retrieve items of value. Some theorize that the processes of modernization and colonization, which began centuries ago, have coalesced into a globalized form, which relies on the continued spread of “Western values” and the consumption of ecological resources, for the ultimate profiteering by multinational corporations (Dauvergne 2008) and the wealthiest families and individuals of the world.

This unbalanced situation of waste production and consumption, and profiteering, has been made possible due to a globalized and deregulated system of capitalism that has

risen through, in part, transnational institutions such as The World Trade Organization, The World Bank, the International Monetary Fund, and the Multinational Agreement on Investments (Sassen 2006; Smith 2007; Featherstone 2007). This constellation of class forces and relations, spearheaded by elitist individuals and interests and labeled by some theorists as the *transnational state*, (which can be thought of as a globalized bourgeoisie), is theorized to be morphing into a more hegemonic form (Robinson 2004). What this will mean for the world is yet to be fully understood, but theorists are concerned that global political monopoly may be a final result (Robinson 2004).

These institutions and the neoliberal deregulatory *free trade* agreements they foster and protect have roots extending from the Trilateral Trade Commission of the 1970s. These transnational agreements pave the way for the flexible and mobile labor force phenomena we have witnessed over the last several decades, as well as the visible increase in resource exploitation (Sassen 2006; Robinson 2004). For instance, many United States-owned companies have factories and operations in other "Third World" countries, and, as they are not tethered to any one geographical place, they tend to move their operations around to where it is most profitable for them currently. Laborers are forced to move if they want to keep their jobs, or are left destitute. The physical environments where these operations set up are often decimated as local environmental resources are exploited before these companies move on to another locale. There is a lack of responsibility and accountability in this system.

It is important to recognize that "free markets" are not equivalent with "fair markets" (Sassen 2006). In neoliberal "free" markets, the globalized agenda shifts the

power out of the state and into the hands of wealthy individuals, big transnational corporations and their officials, think tanks, non-governmental organizations that promote neoliberalism, and politicians and other individuals in government who support the neoliberal agenda. This is made possible through the aforementioned privatization and deregulation (Sassen 2006; Smith 2007).

The core of the problem with the current production and consumption system is greed. It is greed that leads to exploitation, of people and of Nature. The richest one percent of the world's population owns 40 percent of the planet's wealth. The richest ten percent own over 85 percent (Featherstone 2007). The rest of the people are struggling to share and survive off the remaining 15 percent, and in the process are caught in the web of the dominant economic system and all that that entails, consuming cheap goods and expensive dreams, and not having much in the way of alternative lifestyle choices. The majority of individuals may not feel they are being forced into exploitation, and that are free agents participating in the system out of consent; however, it is important to note that consent implies accessibility to alternatives (Ivanova 2011).

*Trash and Ecological Crisis*

Excessive consumption is one of the dynamics that some theorists see as setting the stage for global ecological crisis (Chew 2008). As the culture continues to transition more and more into this unsustainable consumerist model, the whole interdependent ecological system is in demise; the possibility of a global environmental crisis may be looming on the horizon (Chew 2008). Some scholars theorize that capitalism is at the

core of the problem, as capitalism must constantly expand (create profits) to survive (Robinson 2004). In order to accomplish this expansion, resources and labor (people) are exploited. More goods produced equals more waste, more pollution, more methane and carbon dioxide emissions (Featherstone 2007).

Ecological crisis can be caused, in part, by the concatenation of human-caused negative effects on the environment (Chew and Knottnerus 2002). Indeed, and without exaggeration, we could be facing the end of the world, at least the end of a world that could provide a viable environment for human beings to live upon (Chew 2002). In his book *Ecological Futures*, Chew (2002) analyzes past Dark Ages and draws parallels to our modern crises and poses the question of whether we are moving into another Dark Age of human history at this current point in time. He analyzed trends, tendencies, and indicators (such as deforestation, soil erosion, species endangerment, pollution, trade and economic disruptions, de-urbanization, political regime and climatological changes) that were common factors precipitating Dark Ages in the past to predict the next ecological crisis. While ancient civilization collapse is often associated with political dynamics, it is indicated that environmental stress, natural disturbances, and climate changes are also key forces that precipitated system collapse (Chew 2008). Essentially, system transition, or collapse, occurs when the reproductive capacity of the system has reached its limits. Examples include the collapse of the Greek, Roman, and Mesopotamian civilizations (Chew 2008).

Another facet of the issue is the separation of the social from the ecological splits Nature into unrelated parts, and it is this split, this disconnect from the Nature that

supports all life systems, which leads humans to treat Nature as a commodity- to be consumed and exploited (Gottleib 2002). This is a mindset supported by the current culture which can be posited to be the foundation for the environmental degradation that may precipitate “collapse.”

While landfills are only one part of the web of problems that could lead to ecological collapse, it is important to see landfills as a symptom of the larger problem, the tip of the iceberg if you will, and therefore important to study and understand further.

*Conclusion*

Landfills exist because humankind currently needs places to store the large amounts of trash that we, the global (but disproportionately U.S) community, create daily. We are creating this waste because of the current system of production and consumption. This system relies on exploitation of the world’s poorest people and of exploitation of the world’s finite natural resources.

Landfills are not safe or healthy, but are at this current time a necessary means to an end. By reducing the amount of waste sent to landfills via composting, recycling, and conscious consumerism (explored in Chapter Six) waste can, to a degree, be minimized. Though people are often unaware of the connection between the patterns of their own lives and the course of world history (Mills 1959), daily behaviors do have consequences and make differences. What type and how much waste we produce as humans, and how we dispose of and\or process this waste, makes a difference, as does our awareness of larger corporate and industrial factors that are contributing to waste and pollution. This

includes, but is not limited to the issue of landfills. With awareness, maybe we can begin to make changes that extend beyond the individual and affect structural dynamics.

*Humboldt State as a Case Study: Three Phases of Research*

This current project looks at landfill waste on campus at Humboldt State University, using three phases of research. In Phase One, I completed a waste audit of a single building to extrapolate waste behavior on campus. Following the audit, I completed a campus-wide survey to understand the barriers to recycling and composting on campus in Phase Two. Recommendations for future direction, including my specific signage suggestions follow in Phase Three. In the next three chapters, I will explore each of the phases in more detail.

# CHAPTER THREE: PHASE ONE: THE WASTE AUDIT

Going from the global to the local, this project took the knowledge of the vast problems with landfill waste discovered by the literature review and used this information as a catalyst to study landfill on campus at Humboldt State University, where the current study took place.

This chapter will look at the characterization of waste in Humboldt County, California, and then specifically at Humboldt State University, based on past waste audits. Then, I will describe the methods and results of a waste audit I conducted on campus to gain an understanding of the current composition of landfill waste.

## *Waste in Humboldt County*

According to a 2011 Humboldt Waste Management Authority waste audit, over 80 percent of the waste stream was potentially recyclable or compostable, yet had ended up in the landfill. Humboldt County overall reached a 69 percent trash diversion rate (properly recycled and composted materials), about 5 percent more than the statewide average. However, to reach the state's mandated diversion rate of 75 percent by 2020 more work needs to be done (Scott-Goforth, 2015).

## *Waste at Humboldt State University*

Humboldt State University is, and has been, working to lower the amount of waste the campus creates.  For instance, HSU was awarded the silver STARRS rating

(Sustainability Tracking, Assessment and Rating System) in 2013 (Humboldt State University 2013). A quote from the STARS website regarding HSU's plan of action to achieve waste reduction goals reads: "HSU continues to expand its waste reduction operations on campus, primarily through the University's Plant Operations and the Waste Reduction and Resource Awareness Program" (WRRAP 2015). WRRAP hosts a zero-waste branch, which facilitates zero-waste events (e.g., student BBQ's, staff parties, catered events) and they also help take part in diverting 5000 pounds of waste from going to the landfill each semester (Humboldt State University n.d.). Furthermore, departments on campus can now have their events "Green Event Certified" by earning points for employing waste prevention and zero waste measures for their events. For instance, at Humboldt State University, recent past Sociological Department social events on campus were provided with reusable dishware and silverware.

There are several other HSU programs that work to advance, implement, educate, and/or enable sustainable practices. CCAT (The Campus Center for Appropriate Technology) hosts student-led classes and workshops including organic gardening, composting, solar panel installation, and soil ecology to name a few). R.O.S.E. (the Reusable Office Exchange Program) is where students can get free office and school supplies such as binders, pens and pencils, staples, paper, and so on. HEIF (Humboldt Energy Independence Fund) grants money to student-run projects and research, such as a recent grant for OZZIE reusable dishware vending machines (See Irby 2012 for a history of HEIF).

Furthermore, the campus has compost bins around in various locations around campus to gather food waste. Accepted compostable items listed on the HSU website are: coffee grounds, soiled paper products, eggshells, fruits, vegetables, legumes, and grains (Office of Sustainability, n.d.). These items will be sent to an off-site commercial composting facility, once a composting contract is in place, which should be taking place Summer 2016 (Comet 2015). At the time of writing this thesis, however, other than a small amount of waste composted on campus for educational purposes, much of the food waste is ending up in the landfill.

Despite all the positive trends toward waste reduction on campus at Humboldt State University, there seems to be room for improvement. A 2012 Humboldt Waste Management (HWMA) audit of HSU showed that "more than two thirds of wastes (477 tons) from HSU are recoverable either through recycling or composting" (HWMA 2012). "Recoverable" in this sense means the material could have been recycled or composted, but instead ended up in the landfill-bound waste stream. HWMA found that 371 tons was potentially compostable, and included food, compostable paper, and leaves\grass. Food was the most prevalent source of waste, accounting for 32 percent (219 tons). Furthermore, "recoverable paper" accounted for 10 percent of the total (68 tons). "Recoverable paper" refers to paper which could have been recycled. Note that once paper has been soiled such as with food waste (i.e. paper plates and paper napkins) it is not longer recyclable but can still be composted as paper breaks down into carbon.

It can be gathered from the waste audit that it is likely that the Humboldt State University community could reduce the amount of landfill-bound waste. The new waste

processing facility with which the university plans to contract, located in nearby Samoa. will be setting up a “dirty murph” area to go through landfill-bound waste streams with the purpose of pulling out recyclable materials. Humboldt State University is currently looking to contract for a year. Even if recyclables are being diverted, in the end, students may still need to learn pro-environmental behaviors that they can take with them wherever they go, as not all waste streams go through a dirty murph. It is also important to consider how the recycling and composting skills students learn at Humboldt State University will disseminate with them into the world, and will therefore have opportunities to model these new behaviors and skills to others.

For the remainder of this chapter, I explain Phase One of my study, in which I performed an audit on one week of trash from one centrally located building on the Humboldt State University campus. After I explain my methods, and the results of the audit, I discuss the major areas of waste management “problem areas” to suggest priorities for the HSU campus, given my findings. For each type of waste I discuss, I explore the relevance of that particular type of trash.

*The Current Waste Audit*

Working with the Office of Sustainability and Grounds at Humboldt State University, I conducted a waste audit to gain a current snapshot of the waste stream of a single building on campus. The purpose was to get a detailed sense of what was going into the landfill waste stream currently in a classroom-based building used by various academic departments on campus, and thereby deemed a general multi-use classroom

building of some generalizability to many other buildings on campus. This audit gave the Sustainability Office an opportunity to examine a single building in specificity, which the HWMA recent audit did not do.

*Methods*

Siemens Hall is a classroom-based building on campus, with some administrative offices of the top floor. We chose Siemens Hall due to its multi and general- use nature and whose results could potentially generalize to the majority of educational classroom-based buildings on campus.

To complete the audit, seven days of all trash in Siemens Hall thrown into the landfill bins (i.e. those not designated for recycling or composting) were stored by the custodial service in the parking lot area behind Planned Operations department on campus. We chose one week to be a feasible volume to store and sort through that would provide a baseline picture of how much waste was thrown away in Siemen's Hall annually (extrapolating from the week's amount). Note that while waste collected Sunday through Sunday (allowing me to conduct the audit the following Monday), the primary traffic on a college campus is Monday through Friday. Students use the classrooms on the weekends, but to a far lesser extent.

The trash was hauled by Sustainability Office employees to an off-campus location (an industrial building in Arcata, CA which Humboldt State University owned at the time). The trash was laid out on tarps for sorting and weighing (on provided industrial

scales, one per each category) by a two volunteers and myself. We sorted the trash into the categories below, which were weighed and tallied.

*Measures*

The sorted trash was organized into the following basic categories. Each item of trash sorted and categories were weighed on the scales provided. The following are the categories used:

I. Recyclable trash

1. Glass, metal aluminum, and plastic
2. Paper (non-soiled and therefore recyclable)

II. Compostable Trash

3. Food waste, paper towels, and soiled paper
4. “Eco” cups (disposable cups used on campus, marketed as “biodegradable”)

III. True Landfill Waste

5. Food wrappers
6. Miscellaneous trash

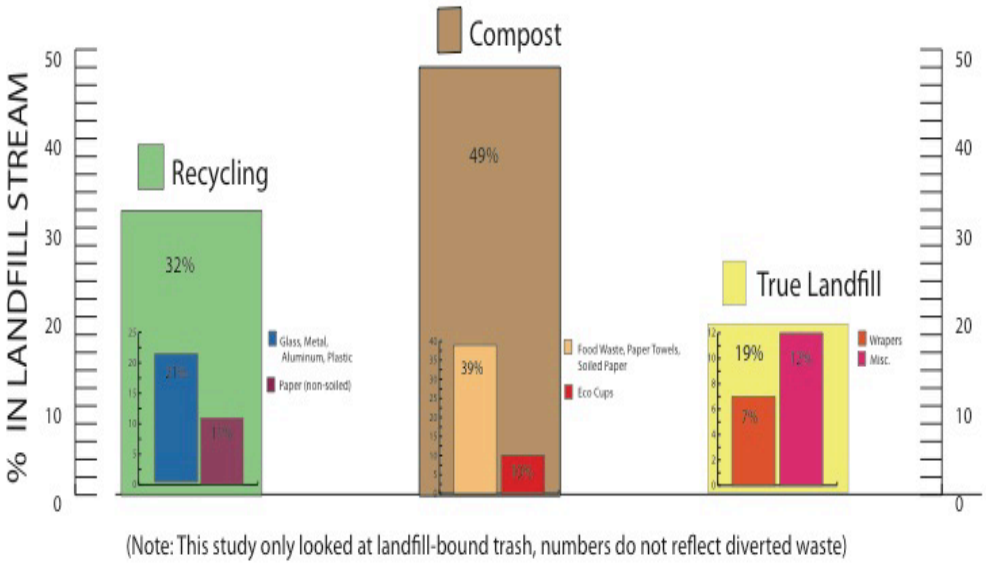



Figure 1: Waste Audit Results

*Results*

We collected, sorted and analyzed 288 pounds of waste. Of the waste collected, sorted, and weighed, just under one-fifth (19 percent) of this waste going to the landfill was found to be "true landfill waste." The rest was potentially divertible via recycling or composting (32 and 49 percent, respectively). Of the nearly one-third (32 percent) of the waste stream that was recyclable, 21 percent was glass, metal, aluminum and plastic and 11 percent was non-soiled paper (i.e. not soiled with food waste). Nearly half (49

percent) of the material we weighed was compostable material (meaning it could have been collectively broken down into fertilizer through the process of composting)- 39 percent was comprised on food waste, paper towels, and soiled paper while 10 percent was “eco” cups. Of the 19 percent that was “true landfill waste” 7 percent was food wrappers and 12 percent was miscellaneous and liquids (see Figure 1).

The total weight of landfill trash for one building for one week was just shy of 300 pounds, which does not include the properly diverted recyclable material from the recycle bins in the building. Consider this: there are over 17 major buildings on campus, not including dormitories. Assuming the findings to be generalizable to other buildings on campus, that would amount to 5,100 pounds per week. Note that while the exact amounts of trash per building will likely vary (for instance the cafeteria will have more food waste and administrative buildings will likely have more paper waste), that is a significant amount of landfill-bound waste, all which will likely end up buried under the ground and\or burned in incinerators. The organic material will break down anaerobically, creating methane gas while the non-organic non-biodegradable materials- such as plastics- will likely remain in the ground for centuries unless treated with specialized bacteria, which is currently experimental (Kawawada 2008). Aside from the environmental impacts, however, increasing the amount of composting on campus will also help to bring Humboldt State University more in alignment with the ecologically sustainable goals it strives towards (Comet 2015).

As Humboldt State University and other California State University campuses are marketing themselves as being more “green” and sustainable, the gap between what is trying to be achieved and what actually is achieved is visible.

*Discussion: Waste Problem Areas*

This section looks deeper in each of the waste problem areas that the current waste audit revealed. Note that E-waste was not part of this study but is an important area of waste (and is considered further in the discussion section).

*Compostable material: food waste, paper towels, soiled paper and “eco” cups*

The current audit revealed that the total amount of compostable material ending up in the landfill-bound waste stream was 49 percent, or just under 150 pounds. Food waste was the largest category of waste by far, accounting for nearly 40 percent of the waste. This is in consonance with the prior Humboldt Waste Management Authority’s waste audit of the campus (HWMA 2012), which also found the majority of landfill-bound waste to be food waste.

Since food waste is all potentially compostable, an increase in food composting waste could make a major impact on the amount of waste going to the landfill. Furthermore, less organic compostable material in the landfill means less anaerobic decomposition and, in turn, less methane gas emissions (U.S. Composting Council). As mentioned previously, a commercial composting facility will soon (Spring 2016) be

accepting the bulk of Humboldt State University's compostable trash (Comet 2014), which up to this point in time has been sent to the landfill.

In addition to food waste, paper towels and disposable "eco" cups are unique sub-categories of compostable material that I will consider separately more in-depth:

*Paper towels*

Paper towels, as mentioned, were part of the overall 49 percent of the waste stream that was potentially compostable. Nationwide, the United States created 3,490 thousands of tons of tissue paper and paper towels in 2009 (E.P.A. 2009). Paper towels are made primarily from wood fiber or, pulp, which can be virgin or recycled. Paper towels are often not recyclable due to being soiled with food, grease, and so forth. They may be compostable, but that is not always a feasible option, based on the proximity of compostable bins.

At Humboldt State University, paper towels are the primary means of hand drying, other than Dyson hand dryers in the library bathrooms. While a possible solution for reducing the amount of paper towels used on campus would be to refit bathrooms on campus with similar dryers, it is an expensive project (Comet 2015). Additionally, the increased electrical use means hand dryers also create a challenge to sustainability of their own. A third option, a towel system that relies of industrial washing and reusing of the towels, presented some hygienic concerns (Comet 2015). To date, no solar powered hand drying machines seem to be available on the market. "Energy efficient" models, such as the Dyson in the library, are the primary model being marketed currently.

Another possible solution to paper towels in the landfill waste would be to separate the towels, and add them to the other compostable materials. There are three possible considerations with this: first, there needs to be an off-site commercial composting facility to handle the composting; at the time of the study, this was not an option for Humboldt State University. Second, to separate the paper towels would require staff to do another task on top of their other duties, and may require additional staff and/or time. Third, while most of the bathroom trash is made up of paper towels, a separate bin for just paper towels would need to be implemented in each bathroom, which is an additional expense, and process to be managed.

Another possible solution for paper towels would be to educate the campus that paper towels are compostable, or educating on strategies for minimizing their usage. Signage, discussed in Phase Three of the current research, is one potential method for educating people about paper towels and other compostable items.

*Disposable "eco" cups*

The waste audit showed that 10 percent of compostable material was composed of disposable "eco" cups (both hot drink cups and the clear cold-beverage containers). A recent (2015) demonstration by The Waste Reduction and Resource Awareness Program (WRRAP)-a student run sustainability organization on campus at Humboldt State University- illustrated that if one person uses one cup each school day for a year, it would equal 150 cups, stretching 68 feet.

The root of the disposable cup problem may be the consumptive practices of modern culture, originating in the Industrial West, and now taking over the globe in various forms. Some theorists believe that disposable cups represent the essence of an over consumptive society, a symptom of an instant-gratification based model that seeks to promise convenience, and in so doing, create a lot of needless waste. (Alsop 2004). It may be that we are "dying of consumption" (Dauvergne 2008 pg. 19) as the more humankind consumes, the more toxic our environment becomes, creating unhealthy living environments for many people through the processes of mass production and disposal of goods and wastes from  (Dauvergne 2008).

While protocols differ in different municipal locations, disposable cups (which includes a broad spectrum of varieties including but not limited to the "eco" cups which are biodegrdable), that are thrown into the recycling bin usually get sorted out as they are considered contaminants and end up being sent to the landfill (Ziada 2004).

For hot beverages Humboldt State University has switched to biodegradable "eco" cups in lieu of the standard polyethylene (plastic) lined paper cups; instead of using plastic to coat the cup to prevent liquid leakage (which renders the disposable cup non-compostable), the layer that coats the inside of the cup is made from corn based biodegradable polylactic acid. Polylactic acid requires high temperatures to break down; specifically, it would take 140 degrees for ten consecutive days with a humidity of 90 percent (Ziada 2004). Therefore, even these biodegradable "eco" cups would require a biodigestor (a piece of equipment designed to maintain high heat and humidity levels to aid in decomposing matter) to break down. All hot beverage disposable cups have a layer

to line the inside to prevent leakage, including all disposable “eco” cups. The corn-based translucent cold beverage cups and lids also require a biodigestor to break down. Humboldt State University currently is looking into purchasing one that would be able to process the volume of disposable cups created on campus however at the current point in time, these “biodegradable” cups are ending up in the landfill stream where they will not break down naturally (Comet 2014).

Additionally, while the corn used for the polylactic acid lining and the cold beverage disposable cups and lids is indeed a renewable resource, the leading producer of the corn based resin used in these disposable cups are produced by NatureWorks, which is owned by Cargill, whose genetically modified crops have been accused of disrupting the ecosystem due to their engineering to be pest resistant. Furthermore, corn is one of the heaviest nitrogen feeders of the vegetables and thus requires more fertilizer, which runs off into local water systems and soils. Chris Choate, a composting expert at Norcal Waste Systems, headquartered in San Francisco, says large amounts of polylactic acid can interfere with conventional composting because the polymer reverts into lactic acid, making the compost wetter and more acidic. Lester Brown, president of the Earth Policy Institute, questions the morality of turning potential food into packaging and lining when so many people in the world are hungry; currently, 12 percent of the U.S. grain harvest to ethanol (Roytle 2006).

One possible solution to the reduce the amount of cups in the HSU waste stream could be to switch to a system of having the campus community bring their own cups, encouraging reusable cup behavior via rewards such as discounts and information, or

encouraging the use of dine-in options, i.e. cups provided to customers to use while eating in the facility. Phase Two of the current research uses a survey to learn more about what would motivate these behaviors by students on campus.

*Recyclable material: plastic, aluminum, glass, metal & paper*

Current audit showed that 32 percent of the landfill-bound waste was composed of aluminum, glass, metal (21 percent) and (non-soiled) paper (11 percent). This shows that while people are recycling, there is room for improvement. Note that this audit only looked at landfill-bound waste. As such, we did not weigh the amount of recyclable material disposed of in the recycle bin. The current audit found recyclables at a higher rate than the previous recent Humboldt Waste Management Authority audit which found a total of 15 percent potentially recyclable items in the landfill waste stream (HWMA 2012).

Although recycling rates are higher than composting rates and have had a positive increasing trend historically, the amount of recyclable waste that ends up in the landfill is still a problem since recyclable items such as glass and plastic takes centuries to break down if they ever do (U.S. Composting Council n.d.). Furthermore, paper which ends up in the landfill instead of being composted (if soiled with food waste) or recycled (if not soiled) will increase the amount of methane gas released in the landfills since it is an organic biodegradable compound which increases the anaerobic activity in landfills, as discussed in chapter one (El-Fadel, Angelos, Leckie 1997).

One unique sub-category of recyclable material are plastic water bottles, which I will consider more in-depth here:

*Plastic water bottles*

Plastic water bottles represent an interesting subset of the recyclable items. While the current audit did not weigh plastic water bottles separately, it is important to make a note regarding plastic water bottles and the environmental effects they have.

Annie Leonard's "Story of Bottled Water: How "Manufactured Demand" Pushed What We Don't Need and Destroys What We Need Most" video (2010) tells us that Americans buy more than half a billion bottle of water weekly needlessly; tap water which runs freely has been found to be cleaner and better tasting (according for example the tests Cleveland ran on their water after Fiji bottled water took a shot at them in their "its not bottled in Cleveland" advertising campaign). Bottled water also costs over 2,000xs that of tap water. The reason bottled water is so popular is that it is a "manufactured demand" which the soft-drink companies created in the 1970s when they saw their soda profits beginning to level off. Using scare-tactics via ads that warned people about drinking tap water, what began as a fringe novelty market has become one of the largest markets globally. To add insult to injury, a third of the bottled water in the U.S. actually comes from tap water sources, not from pristine glaciers and rivers that are pictured on the labels. Companies that bottle tap water include Aquafina (owned by Pepsi) and Dasani (owned by Coke).

The most telltale sign of that plastic water bottle are an environmental problem is that 80 percent of them end up in landfills where they can sit for literally thousands of years. Some are burned in incinerators, which releases toxic fumes. Many plastic water bottles from California that are thrown into the recycle bin are shipped to India, where

they are “down-cycled” into less quality goods. The parts that cannot be down- cycled are often thrown away in landfills in India (Leonard, 2010).

At Humboldt State University, the “Take Back the Tap” program, began by student Natalynne DeLapp, outlawed the sale of plastic water bottles on campus and put up signs around drinking water fountains educating people about how environmentally destructive plastic water bottles can be, the safety of the tap drinking water in the Arcata municipality, and also how much money is saved by using the tap water versus purchasing bottled water. As such, Humboldt State University has made great strides towards reducing plastic water bottle use on campus. None the less, we found significant amounts of plastic water bottles in the landfill-bound waste stream.

It is important to celebrate that recycling has become quite normative in many areas of the country, such as Humboldt County (Comet 2015). This is good news because recycling greatly reduces the amount of trash that is sent to landfills and incinerators (Becker et. al. 2014). Furthermore, manufacturing recycled material uses two-thirds of the energy that would be used is virgin materials were utilized (Becker et. al. 2014). A main predictor found to contribute to recycling behavior include social factors such as recycling opportunities and convenience, however research has found a linear relationships between pro-environmental attitudes and pro-environmental behaviors in general (Hansen et. al., 2008). Therefore, increasing pro-environmental attitudes via educational signage or other means on a school campus could potentially increase recycling behavior more so. The subsequent survey, in Chapter Four, analyzes students’

knowledge and attitudes about recycling on campus at Humboldt State University to learn more about barriers to recycling and how to increase recycling behavior on campus.

*Research questions*

The waste audit results raised the following research questions which provided the foundation for the next steps of this research project: 1) How can we increase recycling and composting on campus?; 2) How can we reduce the total amount of waste created on campus?; 3) What are the (perceived) barriers to recycling and composting on campus?; 4) What can be done to increase reusable cup usage and decrease disposable cup usage on campus?

In the next chapter, I will discuss the second phase of the study: a survey, disseminated to the Humboldt State University campus to try and learn more about why so much compostable and recyclable waste was ending up in the landfill-bound waste stream. I used the questions raised by the waste audit as a basis for the formation of the survey, informing the questions I asked. I outline my methods and results of that survey in the next chapter.

# CHAPTER FOUR (PHASE TWO): THE SURVEY

In this chapter, I explain Phase Two of my study, in which I conducted a survey of students on the Humboldt State University campus. After I explain my methods, and the results of the survey, I will segue into Chapter Five, which will describe the signage suggestions that could be one method to educate for behavioral change, building on the audit and survey results.

## *Methods*

For this phase of the study, I worked with a team of eight students (seven undergraduate, one graduate) as part of a Community Action Research class project. We designed the survey to understand, and potentially find solutions for, the problem of recyclable and compostable material ending up in the landfill-bound streams of waste on campus. Based on the results from Phase One, three research questions guided this phase of research: 1) How can we reduce the amount of landfill-bound trash on campus? 2) How can we increase recycling and composting behavior on campus? and 3) How can we encourage reusable water bottle and coffee cup usage on campus?

To answer these questions, we created a survey, which was approved through the Institutional Review Board (IRB protocol #: 14-093) at Humboldt State University. The survey was launched in two stages: First, we created and launched a pilot survey using Google Forms. We launched the survey online via social media, such as Facebook, to quickly reach as broad of a sample population as possible. The survey was open for a period of one week, during which requests were sent to as many HSU student contacts

(individuals and groups) as possible via convenience and snowball sampling utilizing grassroots networking. A consent form was included as a cover page of the survey, with a button respondents could click "yes" to indicate consent. If they clicked "no" that they did not give consent, they were taken to the end of the survey. Upon completion of the survey, respondents were asked to repost the link to their campus student acquaintances, in hopes of gathering the broadest sample possible. No identifying information such as names or students' IDs were collected in connection to the data, in any way. The data was collected through a Google Document platform (Google Forms), then fed into an Excel spreadsheet, and then inputted into SPSS software for statistical analysis (see appendix for full survey).

In the second stage, we re-launched the survey via pen-and-paper surveys administered in various classrooms on campus with prior teacher consent. The classes were chosen in a quasi-random convenience and snowball manner, with a focus on seeking classes containing a wide range of undergraduate majors. We gained a much higher response rate via these methods, however it created a pile of paper waste, which the online methods avoided. We input the data by hand into SPSS for analysis, in conjunction with the previously inputted digital responses.

*Measures*

The main goal of the survey was to understand levels of knowledge of composting and recycling behaviors on campus as well as to understand perceived barriers to these behaviors.

To understand knowledge levels of composting and recycling on campus, we created a *Knowledge Index* using 20 variables (see Appendix for a full survey questions). Ten of the variables assessed whether respondents knew which particular items would go into which bins, and ten variables were based on a Likert-like scale asking how well respondents know of various waste management programs on campus. To assess if respondents knew where to properly throw their trash away, a list of trash items was provided (used napkins, soiled paper plates, food waste, glass, aluminum cans, disposable clear cups sold on campus (disposable cold beverage "eco" cups), disposable coffee\tea cups sold on campus (disposable hot beverage "eco" cups), plastic bottles, plastic lids from disposable cups, and food wrappers) and respondents could choose "Recycle bin"; "Compost bin"; "Landfill bin (regular trash)" or "Not sure." To assess how well respondents knew of various waste management programs on campus a list of programs was provided (specifically: beverage discounts for bringing their own cup; composting of food waste; composting of disposable cups; composting of paper plates and napkins; recycling of glass, aluminum, plastic; recycling of electronics (e-waste); recycling of ink cartridges; double-sided printing in computer labs; and recycling of paper in computer labs) and respondents could choose "No knowledge of this program"; "Knowledge of this program but don't regularly use"; or "Knowledge of this program and use regularly." Respondents could score between 0 (no knowledge of recycling/composting) and 37 points (high level of knowledge) depending how they answered. One point was given for each correct answer to where to throw their trash away, and two points were given if they

knew of the program listed, one point if they knew but did not regularly use, and zero if they had no knowledge of the program.

To understand perceived *Barriers to Composting* and *Barriers to Recycling* on campus, the survey directly asked what the respondent perceives to be barriers for each were. We gave respondents a list of choices, from which they could choose all that applied. The available responses were:

Table 1: Questions Used to Measure Barriers to Composting and Recycling

| **Concept Measured** | ***Barriers to Composting*** | ***Barriers to Recycling*** |
|---|---|---|
| *Knowledge* | Knowledge of what can be composted | Knowledge of what can be recycled |
| *Availability* | The number of available compost bins on campus | The number of available recycling bins |
| *Bin Locations* | Location of available compost bins | Location of available recycling bins |
| *Messy* | Composting is messy | Recycling is messy |
| *Difficult* | Composting is difficult or confusing | Recycling is difficult or confusing |
| *Time Consuming* | Composting takes too much time | Recycling takes too much time |
| *Reason* | It is not clear why we should compost | It is not clear why we should recycle |

For both *Barriers to Composting* and *Barriers to Recycling*, respondents could also select “Other” with a blank space provided to write in response. No write-in responses of interest were noted.

We also asked respondents about the *University’s Role* in understanding the importance of composting and recycling. Respondents were asked the extent to which they agreed or disagreed that HSU helps them to understand the importance of

composting and recycling, in two separate statements. For each, the respondent could answer along a range of strongly disagree to strongly agree.

To understand possible ways of promoting the *Use of Personal Cups*, we also asked a question specifically asking what would motivate the student to bring their own cup to campus. Respondents could choose all options that applied. The available answer options were: “Drink discounts”; “Free mug given to me”; “Educational materials on the benefits of bringing my own cup”; “Washing stations for cleaning cups” and “Other” (with a blank space provided for writing in response).

In addition, student respondents were asked the following *Demographic* questions: “What is your current class standing”; “How long have you lived in Humboldt County”; and “What is\are your current major(s)” to gain an understanding of the population we were studying.

*Results*

*Demographics*

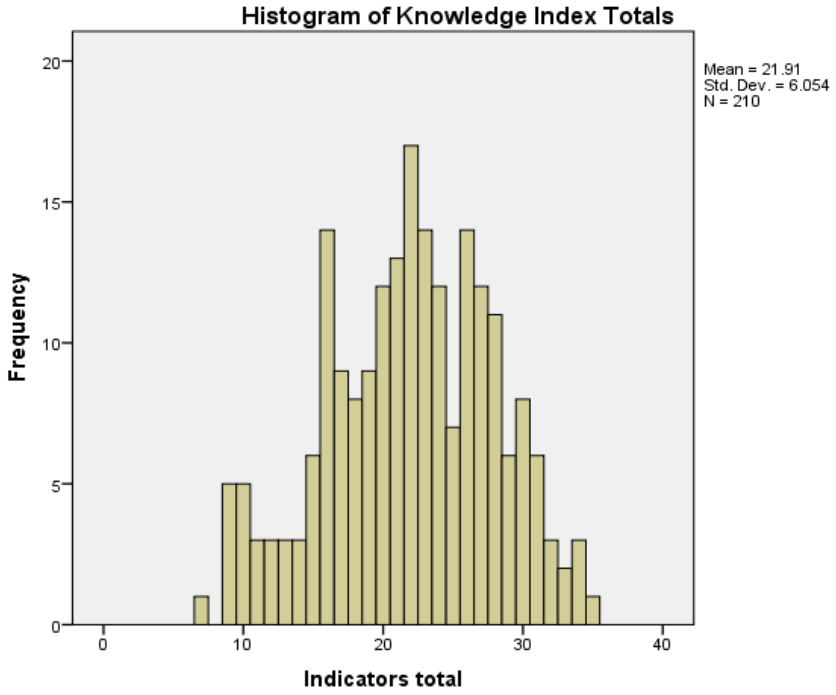
Students completed a total of 210 surveys, which includes both the online and the pen-and-paper versions of the survey. The respondent *Demographics* are displayed in Table 2.

Table 2: Demographics; *n*= 210

| **Measures** | **Percentage** | **Measures** | **Percentage** |
|---|---|---|---|
| ***Time lived in Humboldt*** | | ***Class Standing*** | |
| Less than one year | 34.3 | Freshman | 21 |
| One to three years | 38.6 | Sophomore | 13.8 |
| Four to six years | 14.3 | Junior | 34.3 |
| Seven to ten years | 1 | Senior | 23.3 |
| ***Major(s)*** | | Graduate | 12 |
| Social Sciences | 53.8 | | |
| Natural Sciences | 18.6 | | |
| Liberal Studies | 3.8 | | |
| Other or Undeclared | 23.8 | | |

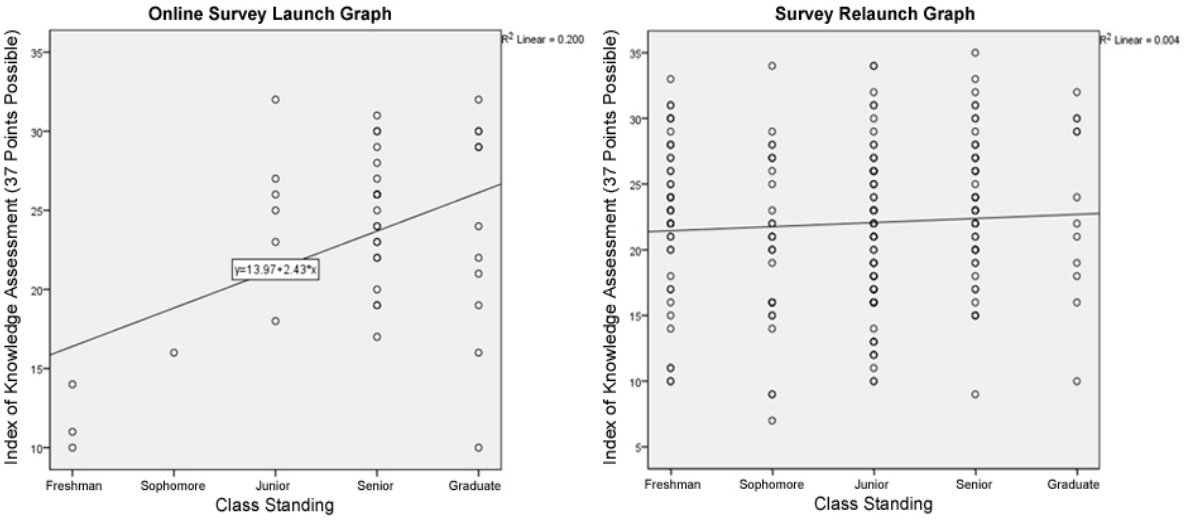
*Knowledge of composting and recycling*

Figure 2: Histogram of Knowledge Index Totals



The most frequent score (mode) for the created knowledge index variable was 22, obtained by 8.1 percent. The mean for this statistic was 21.91 (see Figure two for a histogram of the knowledge index totals). From this we can conclude that, based upon the population surveyed, the general knowledge level of composting and recycling on campus was at slightly more than half of its full potential (since the highest a respondent could score on the knowledge index was 37 points). The highest score obtained was 35, which was obtained by 0.5 percent of the respondents.

Figure 2: Knowledge Index Across Class Standings




Another central finding was that levels of knowledge concerning recycling and composting on HSU's campus do not actually change significantly across class standings. Therefore, as class standing increases (and also therefore the longer they are assumedly

on campus), students' levels of knowledge concerning composting and recycling on campus are not necessarily increasing by much. One of the possible implications of such findings is that no group(s) of students should be given priority over other students when waste reduction programs are initiated to increase awareness. In other words, if freshmen are made to be more aware of HSU's recycling and composting programs during orientation, transfer students should equally be provided a similar treatment (see Figure 3).

Note that when the Knowledge Index variable was statistically cross-tabbed with other demographics variables, no finding of significant interest was found.

*Barriers to composting on campus*

When asked about the barriers to composting on campus, nearly half (46.7 percent) of respondents felt that the main barriers were lack of knowledge of what can be composted in addition to the number of available compost bins. These two options were chosen in conjunction by the 46.7 percent. One-fifth of respondents (18.6 percent) felt that knowledge of what can be composted, but not bin availability, was the main barrier to composting. An additional 16.7 percent felt that bin availability but not knowledge was the issue. The remaining 18 percent chose other barriers such as "unclear why to compost in general" and "compost bins are messy." (See Figure 4)

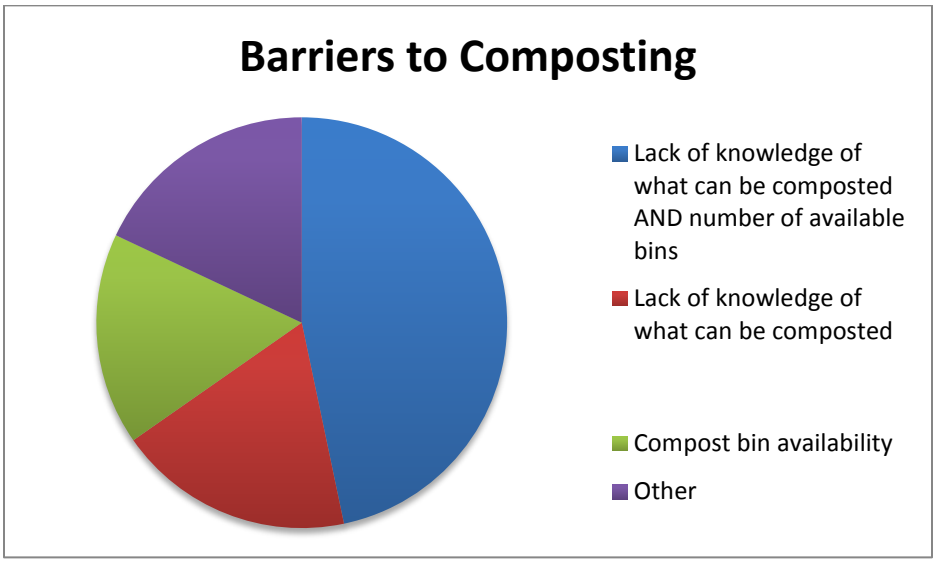



Figure 3: Barriers to Composting

Furthermore, over one-third (36.2 percent) reported no knowledge of being able to compost paper plates on campus and one quarter (25.2 percent) reported that they knew they could compost plates but did not do so regularly. Likewise, 30 percent of respondents claimed they did not know they could compost food waste on campus and 33.8 percent claimed that they knew they could compost food waste but did not do so regularly. Also, a little less than half (46 percent) did not know that used napkins could be composted. While the majority (85.7 percent) claimed to know "what composting means" this could have been a biased response (they said they did but really did not) or indicate a vague understanding of composting but not how they could be involved in composting through their behaviors; likewise, 61.5 percent claimed to know what can be composted on campus (yet the waste audits and other survey questions show that this

may not be correct, or representative of the whole university). On a similar note, 62.4 percent of respondents stated that it was clear how to use the bins at The Depot, while 37.1 percent were unclear to some degree. As seen in Figure 4, just over one-third (34.3 percent) of respondents felt that HSU helped them to understand the importance of composting.

*Barriers to recycling on campus*

In contrast to composting, recycling is far more widely understood and utilized on campus. 77 percent claimed they understood and participated in the recycling program on campus. Only 6.7 percent claimed to have no knowledge of the recycling program at all, and 14.8 percent claimed they had the knowledge but still did not recycle regularly. Similarly, 45.2 percent claimed to use the paper recycling in the printer labs.

When asked barriers to recycling, 25 percent said that knowledge of what can be recycled in addition to available bins was the issue. An additional 32.4 percent reported that knowledge of what can be recycled, but not bins, was the issue while 13.8% reported that it was the number of available bins but not knowledge that was the main barrier. Interestingly, only 1.4 percent reported that understanding why we should recycle (in general) was a barrier, indicating a general mass understanding of the importance of recycling. Lastly, 11 percent chose “other” barrier options (unspecified). (See Figure 5.)

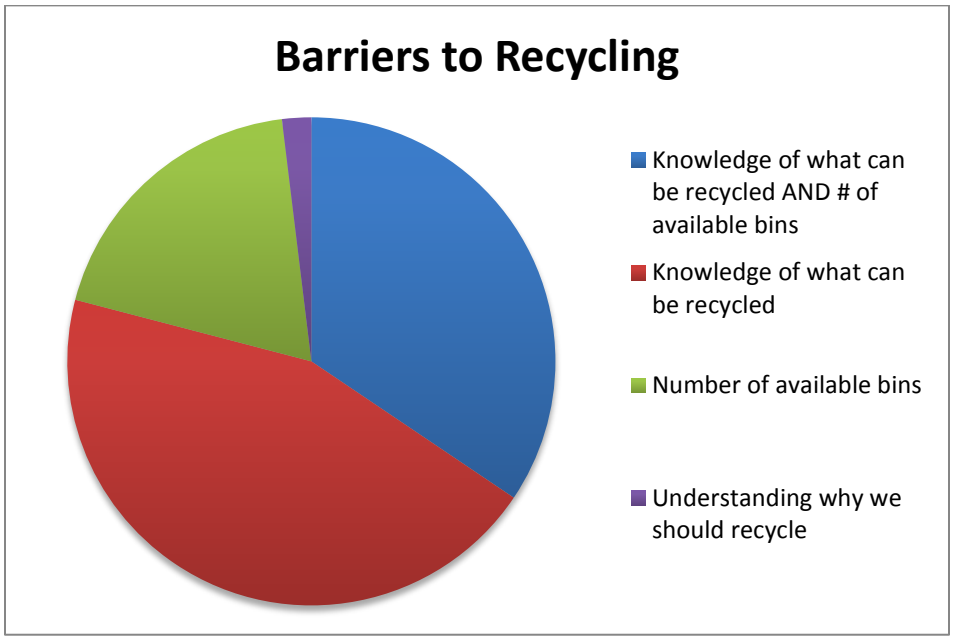



Figure 4: Barriers to Recycling

When asked where aluminum should be disposed, 96.7 percent correctly chose "recycle bin;" likewise, 96.3 percent and 93.8 percent correctly chose "recycle bin" for plastic bottles and glass, respectively. Only 66 percent chose "recycle bin" for the plastic lids of the disposable cups (which, depending on the lid, may or may not be correct) while 20 percent chose "landfill bin" for the lids; 6.7 percent chose "compost bin" and 6.7% also chose "unsure." This illuminates it seems there is a high knowledge of what can be recycled, with the exception of the ambiguity regarding the plastic cup lids.

*Humboldt state university's role*

When asked "To what extent do you agree or disagree with the following: HSU helps me understand the importance of composting" the majority- over 60 percent of respondents- reported that they "neither agree or disagree." Just under and over 20 percent, respectively, of respondents "strongly agree" and "strongly disagree." Just over and under 50 percent, respectively, reported that they "somewhat agree" and "somewhat disagree." (See Figure 6.)

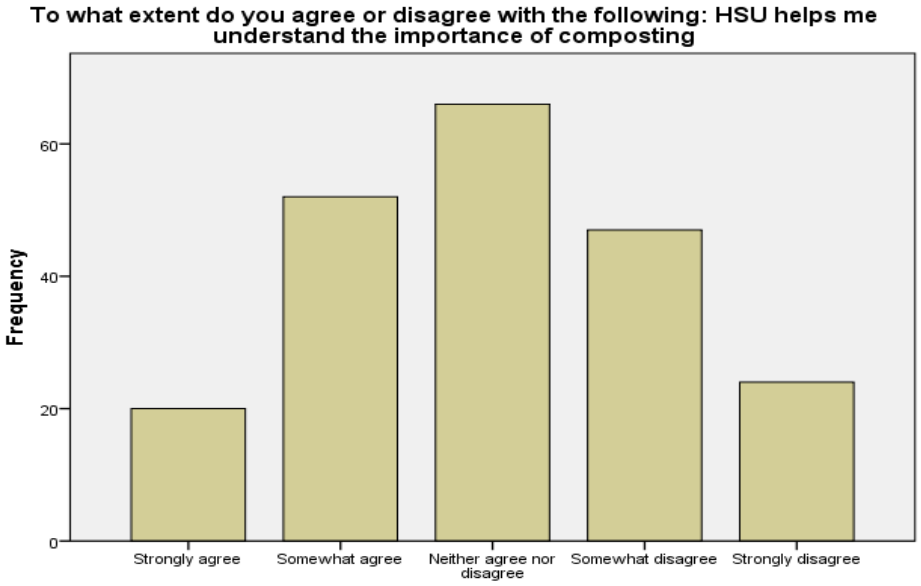



Figure 5: Extent HSU Helps Student Understand the Importance of Composting

Similarly, the survey asked: "To what extent do you agree or disagree with the following: HSU helps me understand the importance of recycling." The majority of respondents, over 70 percent, reported that they "somewhat agree." (See Figure 7)

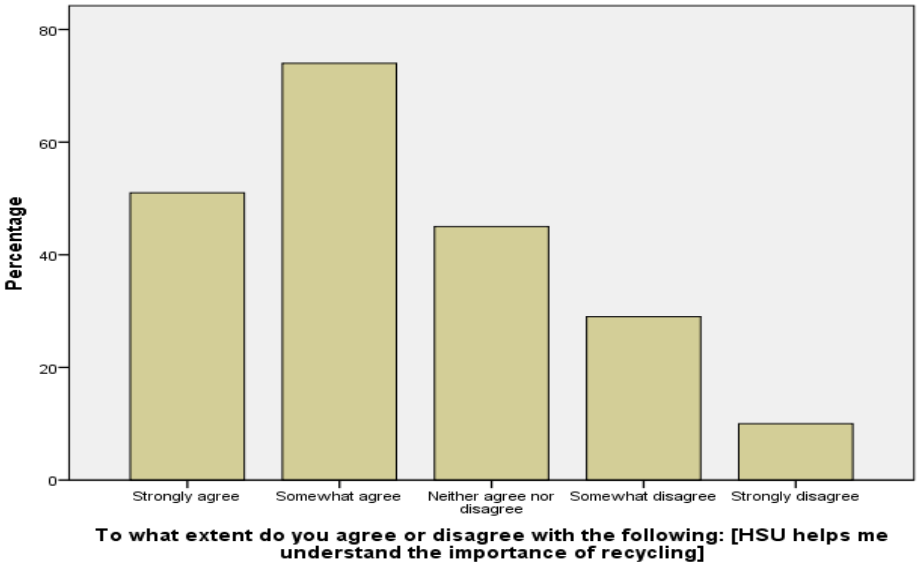



Figure 6: Extent HSU Helps Students to Understand the Importance of Recycling

Another interesting finding is that the less respondents agree about how HSU helps them understand the importance of composting, the less likely they are to be knowledgeable of recycling and composting on campus, and vice versa. The knowledge index total variable, described earlier, was plotted against the responses to the previous questions ("To what extent do you agree or disagree with the following: HSU helps me understand the importance of recycling\composting"). As illustrated in Figure 8, Connecting Salience of Importance with Behavior Frequency, both the regression line for composting and recycling show a positive dependent relationship between the variables (y=25.21+/- 1.08*x and y=25.83 +/- 1.62*x, respectively).

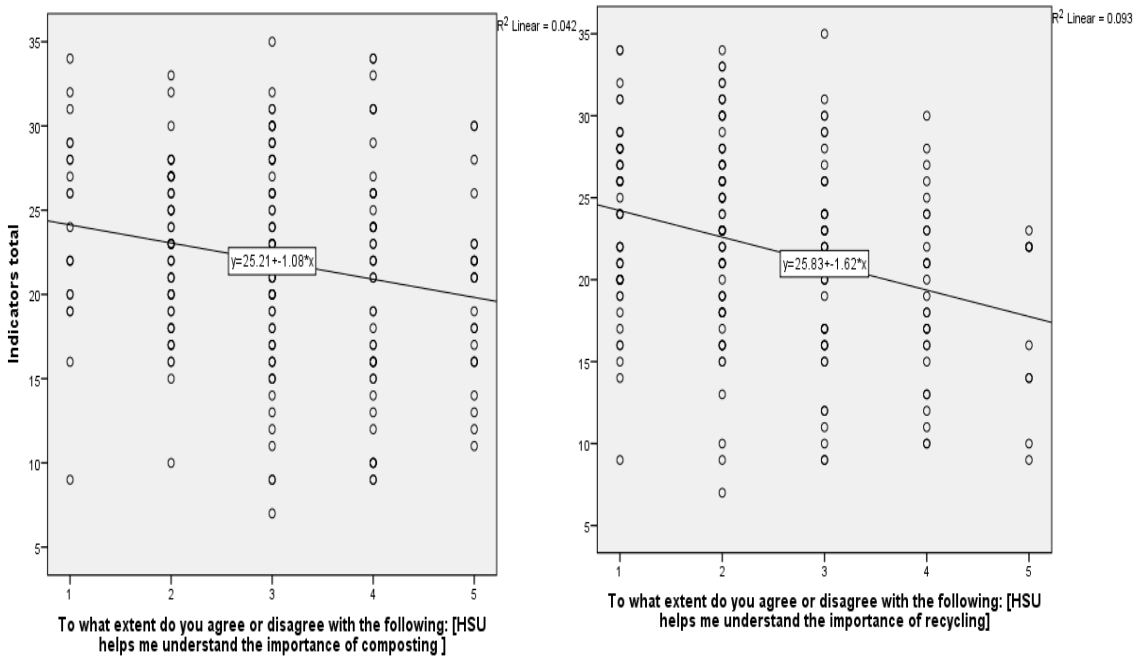



Figure 7: Connecting Saliency of Importance with Behavior Frequency

*Reusable cup behavior*

In regards to reusable cup behavior, only 49.5 percent of the students reported knowing that they could get a discount if they bring their own cup for their beverage purchases on campus; 29 percent claimed to know about the discounts but still not regularly bring their own cup. When asked what would motivate the students to bring their own cup, 21 percent chose the combination of “drink discounts” in addition to “educational materials of the benefits of bringing my own cup;” 50.5 percent chose “drink discounts” without “educational materials;” 3.3 percent chose “educational

materials" without "drink discounts;" and 3.8 percent chose "free cup given to me" and 19.5 percent chose "other." (See Figure 9)

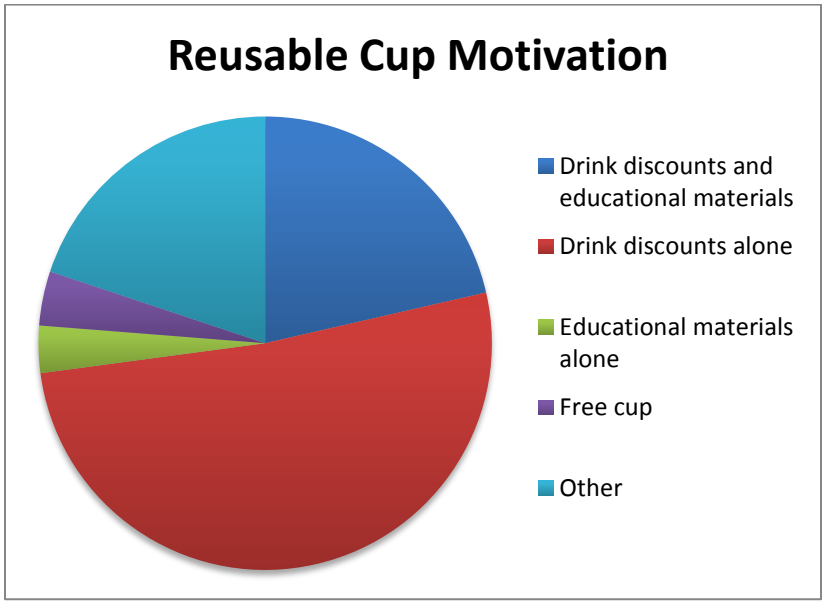



Figure 8: Reusable Cup Motivation

*Recommendations*

While barriers to recycling and composting are complex and multifaceted, it does seem that increasing knowledge of what can be recycled and composted, and how to do so, across campus--all levels of students--would have increase the frequency of recycling and composting behaviors on campus. Including information as to WHY recycling and composting is important is vital to increasing these behaviors as well.

Humboldt State University already has programs to increase recycling and composting; such programs discussed earlier, however, I suggest that a campus-wide

campaign to increase knowledge be implemented that could be reused for several generations of students or until the information is no longer relevant.

Signage may be one of the simplest ways to increase knowledge of recycling and composting on campus. A literary review of some of the basic signage strategies is included in the next chapter. I also provide images that can be used by the Sustainability Office, and campus Dining Services.

# CHAPTER FIVE (PHASE THREE): ADDRESSING THE PROBLEM BY INCREASING KNOWLEDGE VIA SIGNAGE

In this section, I will examine one of the possible ways Humboldt State University can increase recycling and composting on campus: knowledge and information dissemination via signage, to be utilized wherever possible and appropriate (as would be determined by the Sustainability Office on campus), such as The Depot dining cafeteria and on the information boards near the dormitories. Signage and information dissemination as part of a pro-environmental campaign can foster sustainable behavioral change, especially when coupled with environmental manipulation (such as more recycling bins and/or placing bins in convenient locations) (Becker 2014).

## *Best Practices for Signage*

A review of the literature regarding effective signage practices is included here as useful tools for future use. These tools to consider are: interpretive versus regulatory signage, highlighting the individual's internal locus of control & convenience, positive reinforcement and building self-efficacy, clinical validation of barriers, encouraging behavior anyway, normalizing behavior, and stressing local effects (localizing).

### *Interpretive versus regulatory signage*

Marnin Robbins, in his environmental interpretation masters thesis at Humboldt State University (2005), illustrated how interpretative signs- versus sanction-based regulatory signs- could be more effective in instigating behavioral change. A regulatory sign is usually very plain and official looking, with some level of government, such as

county, state, etc., being referenced or alluded to. The wording tends to delineate rules of some kind- e.g. “No Littering”- and may list the penalties for not observing the rules- e.g. “You Could be Fined up to….” An interpretive sign, in contrast, is often more artistic in appearance with more graphics and colors and may appeal to emotions to influence behavioral change versus appealing to rules, e.g. “Please keep the beaches clean and happy” instead of “No Littering.” The interpretive sign may seem friendlier, casual, and peer-made (Robins 2005). Both types of signs seek to influence knowledge, attitudes, and behaviors, but in different ways.

Along slightly similar lines, by engaging both the “brain and the heart” can encourage more lasting behavioral change than engaging just one or the other, in other words, engaging either the feeling or thinking part of the observer (Paul 2010). Appealing to both processing systems “demonstrates the highest efficacy.” Furthermore, it is good to be aware of the “finite pool of worry,” referring to the fact that people can only take so much before we reach worry and information overload. Therefore, when making signs or sharing information in general, cramming too much knowledge, statistics, etc., may have the opposite effect then desired.

*Highlighting the individual’s internal locus of control & convenience*

Values such as helpfulness, accomplishment, frugal living, self-actualization, aesthetics, respect and achievement are positively related with recycling behaviors (Shrum, Lowrey and McCarty 1995). Most interestingly, it was found that those who have an internal locus of control (believe their actions make a difference) engage in more pro-environmental behaviors. Therefore, it may be helpful to combat feelings of

helplessness through a marketing campaign designed to highlight how individual actions DO make a difference. Likewise, the New Economic Foundation (2005) reports that “the most important factor in whether individuals actually behaved in an environmentally friendly way was “personal control” which was defined as “the extent to which participants felt their actions could benefit the environment.”

Furthermore, "those who perceive more inconvenience or effort tend to recycle less" (Shrum, Lowrey and McCarty 1995). Therefore, a simple tool could be to make recycling and composting seem easier and more accessible, as much as possible (Becker 2014).

*Positive reinforcement and building self-efficacy*

"Instead of motivating action, fear messages cause people to avoid thinking about the distressing information” (Frantz and Mayer 2009). If fear messages are to be used, they must be accompanied with strong efficacy-enhancing messages (Frantz and Mayer 2009). For instance, bringing people’s attention to environmental degradation associated with their actions (such as creating and throwing away trash) can be fear-producing; coupling that message with positive reinforcement (such as highlighting what the individual can do to ameliorate the problem, such as recycling, composting, and reducing overall trash creation) can not only make the individual feel better but more likely lead to sustainable behavioral change. Nudging people towards behavioral change using pro-environmental cues coupled with reward (i.e. reinforcement) can create lasting behavioral change (Becker 2014).

Ultimately, by redirecting people's attention from fear and towards positive reinforcement- that what they are doing is being requested, approved, and encouraged- is a helpful tool to increase wanted behaviors. "Positive reinforcement can be used to maintain desirable behaviors" (Shrum, Lowrey and McCarty 1995).

*Clinical validation of barriers, encouraging behavior anyway*

Signs that validate complaints that recycling was inconvenient, but persuaded them to recycle anyhow (validate-persuade model) resulted in longer-term behavior change, by reducing reactance and increasing scrutiny and cognitive elaboration (Carol, Stoll, Birch and White 2002). By empathizing with the barriers to behavior change, it softens the individual's possible initial defense reaction (e.g. "why should I bother?"; "what difference does my action make?") Furthermore, positive attitudes towards environmental behavioral change is linked with amount of awareness one has regarding the environmental issues associated with behavior (Ramayah, Chow and Lim 2012).

*Normalizing behavior*

Normalizing recycling behavior can have lasting behavioral consequences (Ramayah, Chow and Lim 2012). In other words, letting people know they are not alone is very helpful when encouraging new behaviors. No one wants to feel singled out; stressing that the action being requested is part of a social movement and that there is a group of people also doing the requested action can motivate behavioral change. Norms define a range of expected and acceptable behaviors and thereby and serve as a guide or standard for the behavior of members of a social system (Rogers 2003). In a 2007 study, social psychologists found that by applying the norm of reciprocation and the descriptive

norm for pro-environmental action improved guests' participation in one hotel's towel-reuse program. The basic idea, it is purported, can be applied to other environmental issues where a behavior change is being requested (Goldstein, Griskevicius and Cialdini 2007). "Individuals use the behavior of a crowd as a decision-making shortcut thus saving them time and cognitive effort while at the same time producing an outcome that has a high-probability of being effective mostly in terms of fitting in" (Goldstein, Griskevicius and Cialdini 2007). Note, however, that a "boomerang effect" can occur when attempting to invoke normalized behaviors, depending on if an individual is already engaging in requested behavior or not already (Schultz, Nolan, Cialdini, Goldstein and Griskevicius. 2007). Adding an injunctive message (conveying social approval or disapproval) eliminated the boomerang effect in a 2007 study regarding persuading the reduction of household energy use based on social norms (Schultz, Nolan, Cialdini, Goldstein and Griskevicius 2007).

*Stressing local effects (localizing)*

Creating messages about the local effects and impacts of climate change that are coupled with messages about how we can adapt to reduce the impending threat may help to increase behavioral change. In other words, by stressing localized effects of landfill waste, it may be helpful to connect the dots between individual daily behaviors and the bigger picture, inspiring people to consider the question: how is the waste that I create daily tied into larger environmental problems and what can I do to minimize the amount of waste I create thereby doing my part to ameliorate the bigger problems? (Paul 2010).

*Recommendations*

Based upon various best practice strategies, and what we learned from the first two phased of the research, I compiled several strategies for increasing knowledge and motivation for recycling and composting on campus. First, I developed informational language to promote recycling and composting on campus. For each location (e.g. recycling bin), I provide several examples of language, relying on various best practice strategies. Second, I collected a variety of statistics that could be used quickly to give context and importance to the informational language. Last, I provide sign templates, as examples of possible signs that could be used by the Sustainability Office and Dining Services at Humboldt State University. Each of these strategies is explore in more depth, below.

*Informational Language*

*For recycle bins*

Following is a list of informational language "slogans" which can be utilized for recycle bin signage. Prior to each is the signage "tool" used, which was extracted from the literature review, previously described:

1) *Info, Localizing, Reinforcement:* "In ONE week, ONE building on campus created nearly 300 pounds of trash….Over half of it was potentially recyclable….Thank you for putting your recycling in the right bin! You are helping to reduce landfill waste each time you recycle!"

2) *Normalizing and positive reinforcement:* "HSU applauds recycling! Thanks for being on the team! You are awesome!"

3) *Locus of Control:* "Every time you recycle you are helping keep trash out of the landfill! Every small action adds up to make a big difference!"

4) *Making it Easy:* "HSU recycling is single stream- it all goes right here! Can it get any easier to do your part? Thank you for recycling!"

5) *Info & Empowerment:* "Did you know...there are over 1,900 mega-landfills in the U.S., many reaching storage capacity, and often causing pollution of water??...know before you throw…knowledge is power!"

*For landfill bins*

Following is a list of informational language "slogans" which can be utilized for landfill bin signage. Again, prior to each is the signage "tool" used, which was extracted from the literature review, previously described:

1) *Making It Easy, Normalizing, Soliciting Help:* "Landfill Trash Only: Is it recyclable? Is it compostable (food waste, paper plates, paper towels)? If YES, then it does NOT go here! Help HSU reduce our waste and keep the earth healthy!"

2) *Info & Localizing:* "Americans make up only 5% of the world's population but use over 30% of the resources. Want to help lower that? Buy and create less waste, compost food and yard wastes, and recycle more! Only put LANDFILL TRASH here."

3) *Info & Localizing #2:* "Over 77% of HSU's waste is diverted (see www.humboldt.edu/sustainability) - can you help us make it 100% ?? Only put LANDFILL waste in this bin!!"

4) *Validation & Locus of Control:* "It may be a bit confusing, but taking that moment is worth the effort. Every time you throw something away you are choosing where it ends up. Please recycle or compost when possible!"

*Contextual Statistics*

I compiled a list of several relevant statistics (some national, some local), which can be integrated into signage with above slogans or used on their own, when appropriate. For each, I provide a source of the information.

1) Nearly 300 pounds of trash per building per week on campus (Lucarelli 2014).
2) In 2012, Americans generated about 251 million tons of trash and recycled and composted almost 87 million tons of this material, equivalent to a 34.5 percent recycling rate (E.P.A. 2014).
3) On average, Americans recycled and composted 1.51 pounds out of our individual waste generation rate of 4.38 pounds per person per day (E.P.A. 2014)
4) Humboldt County municipal solid waste is going to Anderson, CA, which is about 160 miles one-way. The trucking of our waste creates millions of pounds of CO2 annually (Scott-Goforth 2015).
5) Over 70% of the landfill stream on campus has potential divertable materials (Lucarelli 2014).
6) Americans make up 5% of the world's population but we consume 30% of the resources (Leonard 2010).

7) There are over 1,900 landfills in America (Environmental and Energy Study Institute).
8) The rotting garbage in landfills release significant amounts of methane, a greenhouse gas 20 times more potent than carbon dioxide, which goes straight into the atmosphere (El-Fadel, Findikakis, and Leckie 1997).

*Sign Templates*

One simple way to disseminate information regarding what how and why to compost and recycle at Humboldt State University is to display information on the televisions placed around the Depot cafeteria on campus. Chosen info bits could be printed and displayed on the tables. Upon completion of this project, the following items were turned in to Mr. Ron Rudebach, dining service manager, as well as to Tall Chief Comet, Sustainability Office Director. Some of these images are specifically designed to be used on the lids of landfill-bound trash can lids and recycling bin lids, and some are general information signs, which may be used in any way that could be useful, such as through the television system in the Depot and\or through other means.

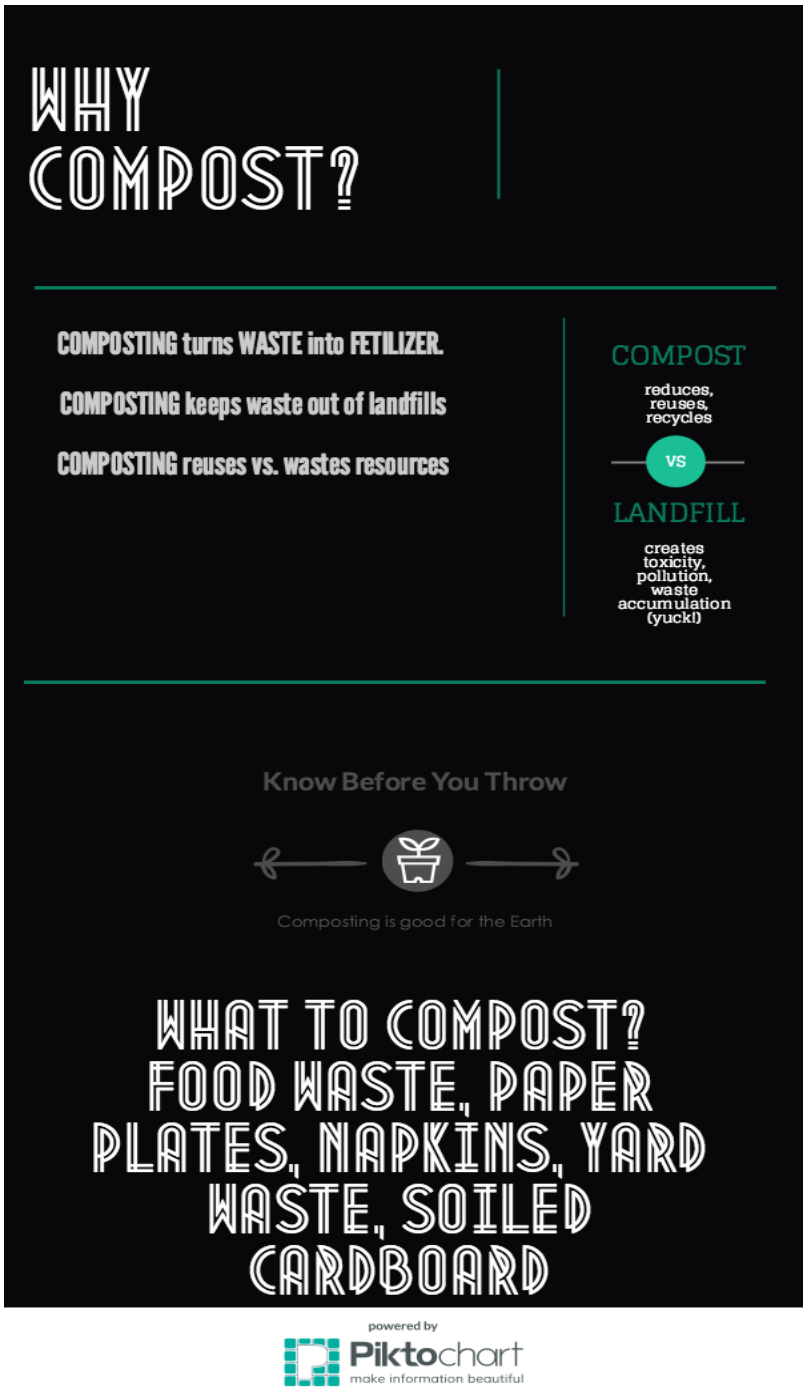



Figure 9: Composting Informational Sign


Figure 10: Reusable Cup Information Sign

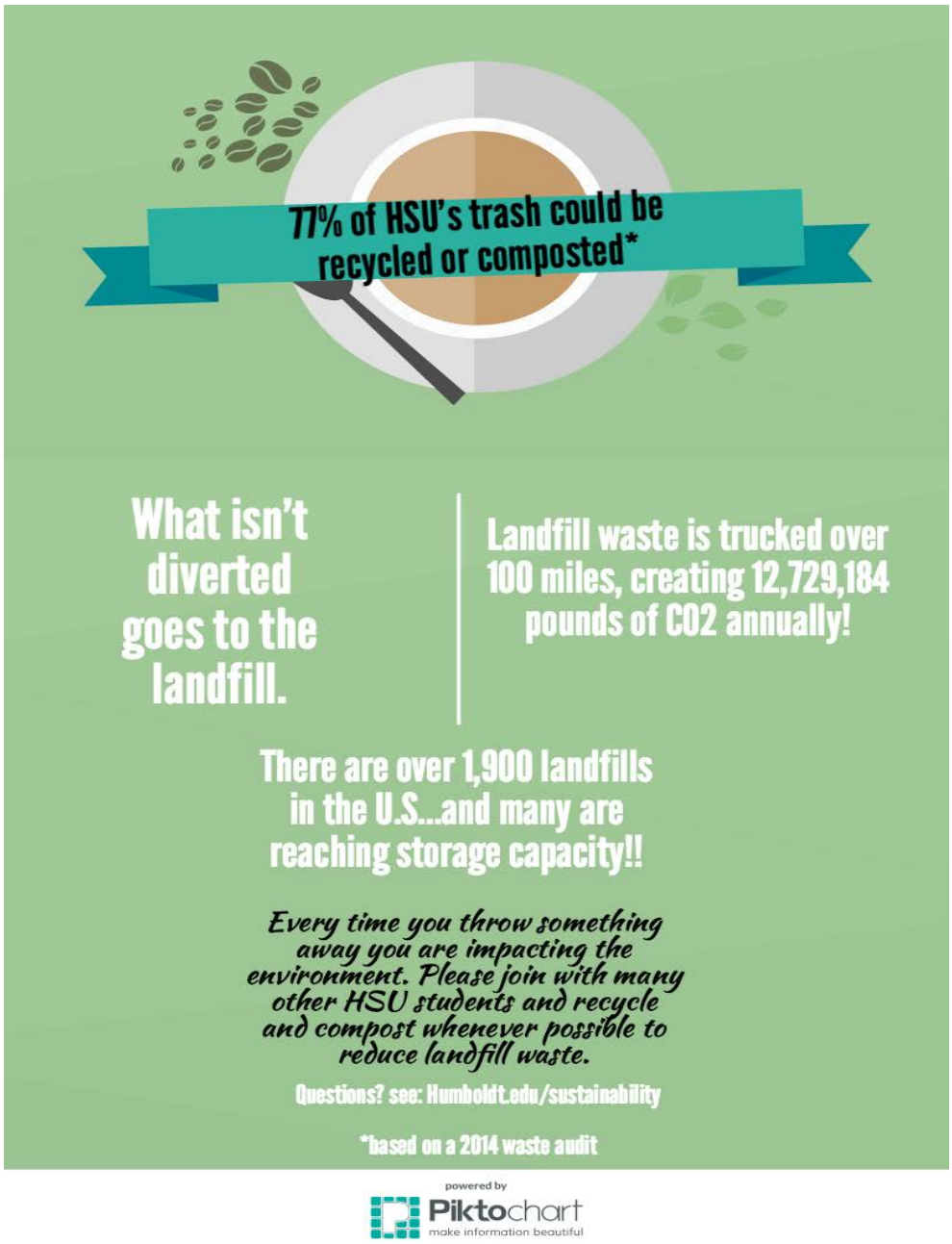



Figure 11: Landfill Waste Information Sign

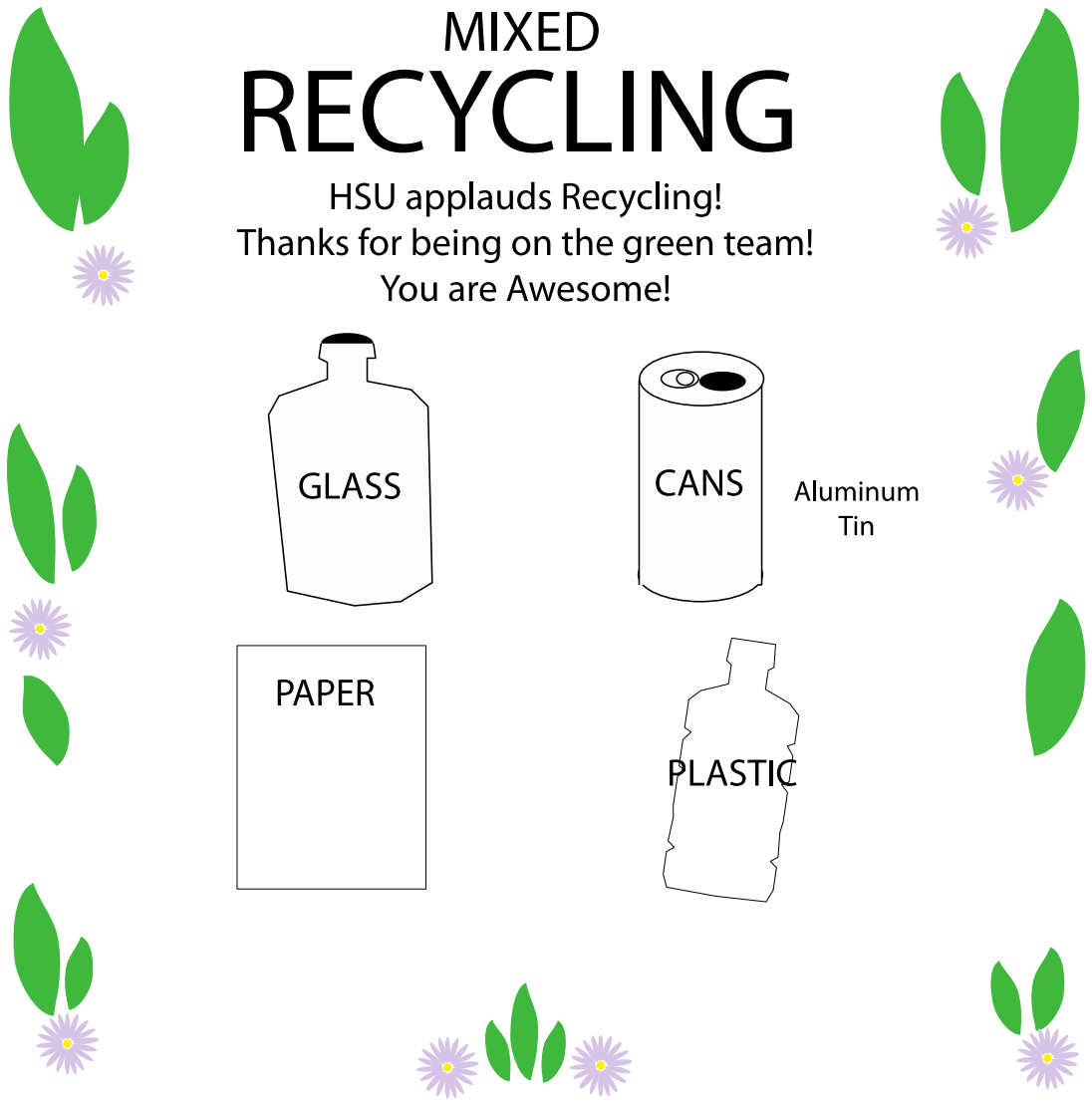



Figure 12: Mixed Recycling Bin Sign- Interpretive Layout


Figure 13: Landfill Waste Bin Sign- Interpretive Layout


Figure 14: Recycling Bin Sign- Plain Option #1


Figure 15: Recycling Bin Sign- Plain Option #2


Figure 16: Landfill Waste Bin Sign- Plain Option #1


Figure 17: Plain Landfill Bin Sign- Option #2

# CHAPTER SIX: PROJECT LIMITATIONS AND CONCLUSIONS

In this chapter, I will examine the current project's limitations and then will share my final concluding thoughts.

*Discussion of Current Project Limitations*

Some of the major limitations of the current project are: generalizability of the waste audit and survey; omission of certain categories of waste from consideration; and the lack of focus group input to vet the signage presented to the Sustainability Office as well as the informational slides I created for Dining Services. I address each of these in more detail below.

With my waste audit, I sorted and weighed one week's worth of trash from one building on campus (Siemen's Hall). While this building was carefully chosen due to its multi-use and heavily utilized nature, the results may not be thoroughly generalizable to the entire campus. While the current audit revealed there is a large amount of potentially divertable waste (both compostable and recyclable) that is ending up in the landfill-bound waste stream, we must consider that other buildings on campus will have different types and amounts of waste. For instance, had the audit been conducted in a food service area, we would have found an even greater volume and overall percentage of food waste. Likewise, certain buildings (such as the Art building and engineering buildings) may have specified types of trash (e.g. paint, scrap building materials, and so forth), which were not found in Siemen's Hall's waste. Furthermore, had the Student and Business

Services building or Planned Operations been audited, we'd likely find more electronic waste.

Electronic waste (commonly referred to as e-waste) was beyond the scope of this project, but deserves to be addressed briefly here. The CBS show "60 Minutes" filmed a 2008 documentary on a town in China dubbed "Wasteland." This place is where much of the e-waste produced in the United States is sent to be sorted and dismantled by the people, including children, in search of the precious metals inside the equipment. Workers earn up to $8.00 per day, often without any safety measures (CBS 2015). Current consumerism trends about quickly replacing electronics means more e-waste is being shipped to this, and other locations. The local environment in these "waste lands" has become completely toxic and has extreme adverse health effects on the local people, such as widespread cancers. Seven out of ten children in the Chinese town have toxic levels of lead in their blood, and pregnancy issues are very common (CBS 2008).

There were other types of waste not considered in this project, such as industrial, agricultural, and medical waste. This project focused only on municipal waste, and specifically waste produced at Humboldt State University. It is important to keep in mind, however, that the problem of waste extends far beyond individual and household waste, and to examine these areas when appropriate.

A final limitation to note is that there was a lack of focus group vetting for the signage I created for the Sustainability Office (for possible use on new trash and recycle bins) and Dining Services (to be used in food service areas). Though I created the signs

using what I learned from my best practice literature review, future research should test the effectiveness of the signs on students, staff, faculty and administration. This is an opportunity for another project to take this further, and is an interdisciplinary venture that could utilize environmental resource management, graphic design, and sociological skills.

I would also like to honestly share that it has been quite difficult to write this paper from an objective perspective. Self reflection has revealed to me that I am a passionate environmentalist who cares deeply for our planet and am very concerned about the environmental issues such as global climate change, timber clear cutting, and sea level rise, which we as a global society are currently facing. Tracing how landfill waste on a college campus connects to the bigger picture of environmental degradation has been eye opening and sobering. While it is important to remain scientific and rational, even when examining such emotionally potent topics, it is also important to not become to detached from the reality that what we are studying has effects for all life on earth and is not just another research project. Finding this balance has been difficult to say the least while writing this paper and I hope I achieved it somewhat.

*The Individual's Role: What We Can All Do to Help Ameliorate the Problem*

Recycling, composting, and conscious consumerism are three of the big ways we can each make a difference, according to Devall (1993). Echoing similar themes, the U.S. Environmental Protection Agency (E.P.A.) states that reducing, reusing, recycling, and rebuying are the four key "Rs" to divert waste from landfills and incinerators. The E.P.A. concludes that "waste reduction and recycling prevents greenhouse gas (GHG) emissions,

reduces pollutants, saves energy, conserves resources, and reduces the need for new disposal facilities" (U.S. Composting Council).

Trying to reduce the amount of waste we each create each day is a way we can cumulatively make a big impact. Using reusable water bottles, coffee mugs, shopping bags, and food containers is a good start (Comet 2014). Making connections between one's purchases and the environment is huge. For instance, purchasing recycled fiber paper towels and other paper goods tells companies that the demand is for recycled goods versus goods made from virgin pulp fibers. This, in turn, will reduce the amount of trees cut down to produce virgin fiber products (Trask 2006).

Social modeling is powerful tool to catalyze behavior change. When we see our peers doing a behavior, e.g. throwing recyclable trash into the recycle bin or throwing compostable waste into the compost bin, it increases the likelihood of that behavior being replicated by the observer. In other words, *be the change* that you want to see in others.

Furthermore, *think globally and act locally* (Robinson 2004). "Consumption can no longer be seen as an innocent act, but as part of the chains of interdependencies and networks which bind people together across the world in terms of production, consumption, and also the accumulation of risks….consumer culture has become too firmly established as part of the taken-for-granted value assumptions of the contemporary age for it to be easily modified, or discarded altogether" (Featherstone 2007:xvi) Our actions of consumption have effects. Purchasing locally produced goods reduced the carbon footprint associated with those goods as they were not trucked for far distances

and often use locally sourced parts\ingredients. Supporting local products also contributes to the health and vibrancy of that community.

*Conclusion*

To summarize, this project conducted a literature review to unveil the problems with trash- environmental, socio-political and fiscal- as well as the capitalist consumerist roots to the issue of massive waste creation. I then conducted a waste audit on campus at Humboldt State University and determined that over 80 percent of the landfill-bound waste stream was potentially divertable via recycling and composting. I then disseminated a campus-wide survey to better understand the barriers and motivations to recycle and compost on campus, as well as to gauge the level of knowledge regarding these behaviors. Lastly, I created informational signage based on the literature review and the data obtained which was submitted to Dining Services and the Sustainability Office on campus at Humboldt State University. At the end of this journey I feel I have discovered both sobering and inspiring truths: yes there is a lot of waste being created daily, but since a majority of this waste is potentially divertable waste there is a huge potential for landfill waste reduction via fairly simple behavioral change (i.e. recycling and composting).

It is important to keep in mind that “moments of transition” and change offer opportunities for new worldviews and life practices to emerge (Chew 2008). Becoming aware of the environmental and ecological issues of our time can be daunting and

paralyzing, but it can also be a catalyst for system re-organization and positive growth, on both the individual and the systemic levels. Ultimately all we can all do is our best, day by day, and encourage others to do the same. Equipped with knowledge we can move forward with the intention to make life sustaining changes in our lives and therefore in the world.

Where there is potential for change, there is always hope.

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APPENDIX



# Waste Disposal Behavior Survey

Overview

This is a research study being conducted by a graduate student in sociology under a placement with The Office of Sustainability on campus. The research questions are: 1) What can we do to increase recycling and composting on campus?; and 2) what can we do to reduce landfill waste created on campus? In this survey we are seeking to understand people's behavioral motivation in regards to recycling and composting as well as reusable cup usage. We are also seeking to understand the level of knowledge students have about these behaviors on campus. You may contact Dr. Meredith Williams at mw1167@humboldt.edu or (707) 826-3011 or Sara Lucarelli at: srl15@humboldt.edu or 707-616-4449 with any questions.

Participant Role

Your part in this study is to help us gain valuable information that can be used to make positive changes on campus with the overall goal of reducing landfill waste and thus reducing HSU's overall carbon footprint.

Risks and Benefits

You understand that we will not link your identity to the survey responses you provide and therefore can be assured anonymity.

There are no identified risks. The survey should take approximately ten minutes to complete.

You understand that the benefit to participating is that you are helping us gain valuable information that will lead to changes on campus with the goal of ultimately benefiting all. Thank you very much for your input.

Voluntary Participation

You understand that your participation in the survey is completely voluntary, and that you may decline to enter the survey or may withdraw at any time without jeopardy. The Investigator will answer any questions you have about this study. Your participation is voluntary and you may stop at any time.

If you have any concerns with this study, contact the Chair of the Institutional Review Board for the Protection of Human Subjects, Dr. Ethan Gahtan, at eg51@humboldt.edu or (707) 826-4545.

If you have questions about your rights as a participant, report them to the Humboldt State University Dean of Research, Dr. Rhea Williamson, at Rhea.Williamson@humboldt.edu or (707) 826-5169.

Confidentiality

Your individual privacy will be maintained at all times. You understand that direct quotes may be used from open ended answers, but they will not be associated with your name in any way.

Consent

Please print this consent form now and retain for your future reference if you would like. If you agree to voluntarily participate in this research as described, please continue.

Thank you so much for your time and input!

* Required

1. **I have read and understand the information provided, and agree to participate in the following survey** *

   please indicate if you consent and would like to take the survey
   *Mark only one oval.*

   - Yes, "I consent to participate"
   - No, "I do not consent to participate" *Stop filling out this form.*

2. **To the best of your knowledge, where would you dispose of the following items?**
   *Mark only one oval per row.*

| | Recycle bin | Compost bin | Landfill bin (regular trash) | Not sure |
|---|---|---|---|---|
| Used napkins | | | | |
| Soiled paper plates | | | | |
| Food waste | | | | |
| Glass | | | | |
| Aluminum cans | | | | |
| Disposable clear cups sold on campus | | | | |
| Disposable coffee/tea cups sold on campus | | | | |
| Plastic bottles | | | | |
| Plastic lids from disposable cups | | | | |
| Food wrappers | | | | |

3. **Please select an answer based on the extent you agree or disagree with the following statements:**

*Mark only one oval per row.*

| | Strongly agree | Somewhat agree | Neither agree or disagree | Somewhat disagree | Strongly disagree |
|---|---|---|---|---|---|
| I know what "recycling" means | | | | | |
| I know what can be recycled on campus | | | | | |
| I find it convenient to recycle on campus | | | | | |
| It is easy to recycle in campus computer labs | | | | | |
| HSU helps me understand the importance of recycling | | | | | |
| I know what "composting" means | | | | | |
| I know what can be composed on campus | | | | | |
| I know where to find the compost bins on campus | | | | | |
| I find it convenient to compost on campus | | | | | |
| I am never far away from a place to compost on campus | | | | | |
| HSU helps me understand the importance of composting | | | | | |
| It is clear how to use the waste disposal bins at The Depot | | | | | |
| I regularly bring my own cup to campus for beverages | | | | | |

6. **In your opinion, what are the main barriers to composting on campus?**
Please select all that apply
*Check all that apply.*

- [ ] Knowledge of what can be composted
- [ ] The number of available compost bins
- [ ] Location of available compost bins
- [ ] It is not clear why we should compost
- [ ] Composting is messy
- [ ] Composting is difficult or confusing
- [ ] Composting takes to much time
- [ ] Other: _____

7. **In your opinion, what are the main barriers to recycling on campus?**
Please select all that apply
*Check all that apply.*

- [ ] Knowledge of what can be recycled
- [ ] The number of available recycling bins
- [ ] Location of available recycling bins
- [ ] It is not clear why we should recycle
- [ ] Recycling is messy
- [ ] Recycling is difficult or confusing
- [ ] Recycling takes too much time
- [ ] Other: _____

8. **What is your current class standing?**
*Mark only one oval.*

- ( ) Freshman
- ( ) Sophomore
- ( ) Junior
- ( ) Senior
- ( ) Graduate Student
- ( ) Other: _____

4. **We are trying to determine how well people know about a variety of campus programs, and how often they use them.**

Please select the answer that best represents your knowledge, and use, of these campus programs related to waste management
*Mark only one oval per row.*

| | No knowledge of this program | Knowledge of this program but don't regularly use | Knowledge of this program and use regularly |
|---|---|---|---|
| Beverage discounts for bringing your own cup | | | |
| Composting of food waste | | | |
| Composting of disposable cups | | | |
| Composting of paper plates and napkins | | | |
| Recycling of glass, aluminum, plastic | | | |
| Recycling of electronics (e-waste) | | | |
| Recycling of batteries | | | |
| Recycling of ink cartridges | | | |
| Double-sided printing in computer labs | | | |
| Recycling of paper in computer labs | | | |

5. **What has motivated you, or would motivate you, to bring your own cup to campus for beverages?**

Please select all that apply
*Check all that apply.*

- [ ] Drink discounts
- [ ] Free mug given to me
- [ ] Educational materials on the benefits of bringing my own cup
- [ ] Washing stations for cleaning cups
- [ ] Other: _____

9. **How long have you lived in Humboldt County?**
   Please select the option that best applies
   *Mark only one oval.*

   - Less than one year
   - 1-3 years
   - 4-6 years
   - 7-10 years
   - More than 10 years

10. **What is/are currently your major(s)?**

11. **What other thoughts do you have about increasing recycling and composting on campus?**